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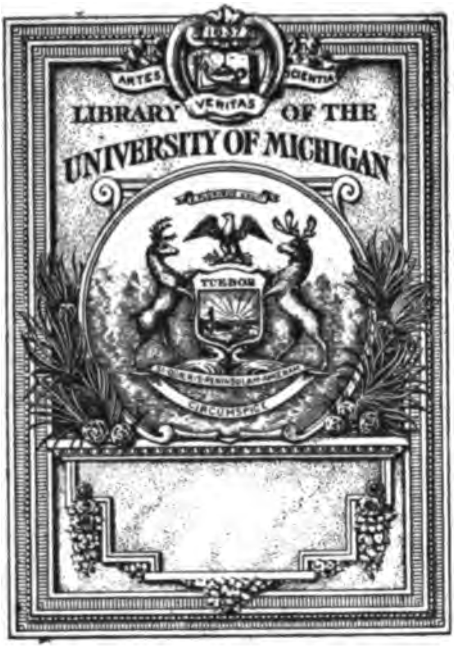
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REPORTS OF THE

DEPARTMENT OF THE INTERIOR

FOR THE FISCAL YEAR ENDED JUNE 30

1918

▽

VOLUME I

SECRETARY OF THE INTERIOR
BUREAUS, EXCEPT OFFICE OF INDIAN AFFAIRS
AND RECLAMATION SERVICE
ELEEMOSYNARY INSTITUTIONS

WASHINGTON : GOVERNMENT PRINTING OFFICE : 1919

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Administrative reports, in 2 volumes.
- Vol. I. Secretary of the Interior.
  - Bureaus, except Office of Indian Affairs and Reclamation Service.*
  - Eleemosynary institutions.
- Vol. II. Indian Affairs.
  - Territories.

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* The Report of the Reclamation Service is not included in this report as it is made to Congress and printed under its direction.

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REPORT OF THE SECRETARY OF THE INTERIOR

BUREAUS OF THE INTERIOR DEPARTMENT.

The Department of the Interior was established by the act of March 3, 1849 (9 Stat. L., 395).

GENERAL LAND OFFICE.

Organized as a bureau of the Treasury Department under act of April 25, 1812 (2 Stat. L., 716).

First commissioner, Edward Tiffin, of Ohio; appointed May 7, 1812.

Became a bureau of the Interior Department when that department was organized under the act of March 3, 1849 (9 Stat. L., 395).

INDIAN OFFICE.

Organized as a bureau of the War Department under act of July 9, 1832 (4 Stat. L., 564).

First commissioner, Elbert Herring, of New York; appointed July 10, 1832.

Became a bureau of the Interior Department when that department was organized.

BUREAU OF PENSIONS.

Organized as a bureau of the War Department under act of March 2, 1833 (4 Stat. L., 622).

First commissioner, James L. Edwards, of Virginia; appointed March 3, 1833.

Became a bureau of the Interior Department when that department was organized.

PATENT OFFICE.

Organized as a bureau of the State Department under act of March 4, 1836 (5 Stat. L., 117).

First commissioner, Henry S. Ellsworth, of Connecticut; appointed July 4, 1836.

Became a bureau of the Interior Department when that department was organized.

BUREAU OF EDUCATION.

Organized under act of March 2, 1867 (14 Stat. L., 434).

Became a bureau of the Interior Department July 1, 1869, under act of July 20, 1868 (15 Stat. L., 106).

First commissioner, Henry Barnard, of Connecticut; appointed March 14, 1867.

GEOLOGICAL SURVEY.

Organized as a bureau of the Interior Department under act of March 3, 1879 (20 Stat. L., 394).

First director, Clarence King, of New York; appointed April 14, 1879.

RECLAMATION SERVICE.

Organized under act of June 17, 1902 (32 Stat. L., 388), under the Director of Geological Survey, Charles D. Walcott.

First director, F. H. Newell, of Pennsylvania; appointed March 9, 1907.

BUREAU OF MINES.

Organized as a bureau of the Interior Department under the act of May 16, 1910 (36 Stat. L., 369).

First director, Joseph A. Holmes, of North Carolina; appointed September 3, 1910.

NATIONAL PARK SERVICE.

Organized as a bureau of the Interior Department, under the act of August 25, 1916 (39 Stat. L., 535).

First director, Stephen T. Mather, of Illinois; appointed May 16, 1917.

REPORT OF THE SECRETARY OF THE INTERIOR.

DEPARTMENT OF THE INTERIOR,
Washington, D. C., November 20, 1918.

SIR: Throughout the past year this department has been engaged upon three lines of effort:

(1) The normal conduct of its many bureaus in their relation to the life of our people: The distribution, survey, and classification of our national lands; the care of the Indian wards of the Nation, their education, and the development of their vast estate; the carrying forward of our reclamation projects; the awarding and issuance of patents to inventors; the construction of the Alaskan railroad and the supervision of the Territorial affairs of Alaska and Hawaii; the payment of pensions to Army and Navy veterans and their dependents; the promotion of education; the custody and management of the national parks; the conservation of the lives of those who work in mines, and the study and guidance of the mining and metallurgical industries.

(2) Emergency work arising out of war conditions: This was an extension of the undertakings reported upon last year in which was shown how a nonwar department found itself a base or source for men, information, and effort necessary to the conduct of modern warfare. The interdependence of two of our scientific bureaus with almost all agencies more directly connected with some phase of war work is graphically shown by two charts which follow this introduction to the report.

(3) Looking-forward work: The consideration of those problems suggested by conditions arising out of the war which the Nation will be called upon to meet in the immediate future. I have taken occasion during the year to call some of these to your attention by letters which are appended and upon which I wish somewhat to comment.[1]

Throughout the war I have sought to learn the significance of its larger phases as affecting our national life with relation to the duties of this office, and I believe that some of those ills which have fallen upon other lands may, in some part at least, be kept from our doors by the development of policies which are already in a small way being carried out by this department.

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[1] See pp. 24-29.

One of those policies is that our schools shall be made to more completely serve America as a Nation. The other policy is that the lands of this country shall not lie unused. Both may be included in the broader meaning of the word "Americanization"—for one makes for the development of more helpful American citizens, and the other makes for the development of more serviceable American acres. For the intensification and extension of these two policies I would make earnest appeal that the high advantages of freedom which we have championed may be the more perfectly realized.

THE RETURNING SOLDIER.

Soon, almost immediately now, the men whom we have drawn into war will return. Already those here are being prepared for their reabsorption into the normal currents of our life and the two million and more who have had the glory and the experience of making war upon foreign soil in protection of the liberties of the world will be brought back as soon as their work is done. With conditions as fluent as they are in Europe I presume that no one can foretell when the last man will be once more in America, but whatever the day of their coming their welcome can not be too warm or our appreciation of their service too hearty.

And the question is pertinent: What shall that welcome be? Is it to be merely one of glad greetings, the emotional outburst of a moment, or shall it take on a more permanent form, one which will be adequate in its largeness and lasting in its nature? I am quite sure, as I wrote you in May, that we can make of this event something that is real, something exceptional and of the most permanent value to the men and to the Nation.

No one can tell what such an experience will have done for these boys. They have not seen the picture of the war in the broad view that has been given us from day to day. The map which we have studied has not been theirs. To them the sector on which they fought, the valley up which they marched, the ruined villages which they saw, the narrow trench in which they lived, the desolate blasted foreground of No Man's Land—these composed their picture. Life has been a series of incidents, sobering, strengthening, horrifying, democratizing. Through these they will have grown, all of them. They will come back other than they went. They have lived through years in the months they have been gone. They may not have gained the larger view of the great war, being too near to see, but they will have gained a new view of America.

They will return home as victors; proud, no doubt, and becomingly modest, with a new sense of their individual power and new tests set up in their minds as to the qualities which make a man. We will hold them at arm's length and look into their eyes to see what change war has made upon them, the doing of daring things, the taking of ordered risks, the prompt recognition of authority, the steady, long companionship of their fellows, the sight and enduring of suffering, the hard life of dust and mud and weary walking and long, sleepless nights. We will look hard into the sunburned, hardened faces to see what the strange life of a few months has done to these boys, these youngsters of but a day ago. They will resent, maybe, as soldiers should, the soft sympathizings that will be poured out upon them, just as they will make light of all that they have done. But out of every mouth and from every heart will come the words, "Well, home sure looks good to me!"

"WHAT IS TO BE MY CHANCE?"

They will be looking at us, too! And in their look will be a query, one thought over in the trench at night and on the long, slow "slog, slog, slog" of the day's march: "What is my life to be when I get home? Am I to go hustling for a job or will the old place be mine? But if a girl has that place and wishes to be her own mistress in the future—what then? School? Oh, I can't go back to school. When I left I was only 21, but now I'm 31. And I have lived with men, fought with them, been sometimes bested by them, learned to know them in all their many littlenesses and their great goodnesses. Responsibility has been mine, and the still silences of the night have given me chance to think and wonder why I am and why it should make any difference whether I ever saw home again or not. I am back now, back for a man's life. This America that called me out has called me back, and it will have something for me to do. Now, what is to be my chance?" This will all be implied in the look that they give us as we hold them by both shoulders to find the mark of war upon their young faces. And what is to be our answer? What answer is due them, and what answer is worthy of us?

Being Americans and being young, they will not ask or expect pensions. They will want work. They will want, if possible, a chance for a home of their own. They would like to know that while perhaps the fortunes of war did not so turn as to bestow on them the medal for distinguished service, the Nation which they served thought well enough of what they had done to give them some evidence of its appreciation.

Now, these hopes, reasonable and manly as they are, can be met, and in a fashion that will not weaken the fiber of the man, by making him an object of bounty, and that will add permanently to the strength and the wealth of the Nation.

Why not say to this inquiring soldier man: America offers you a farm if you will help in its making and pay for it out of what you make out of it.

This can be done, and, if it were, it would solve, or tend largely to solve, several problems:

(1) That of the immediate job for the man himself.

(2) That of protecting the labor market against any possible collapse by being swamped with a surplus of labor.

(3) That of providing for many lines of reestablished industry an immediate demand for their products.

(4) That of staying the movement toward the cities, and thus more completely decentralizing our population.

(5) That of affixing to our soil a large number of the best-proved Americans.

(6) That of setting up throughout the land the most modern pattern of farm settlement in which the social side of human nature is given consideration.

(7) That of bringing into use those great areas of our land which now lie neglected and of no value to the world.

All of these objects, I apprehend, will be deemed worthy, desirable, and of great concern to the Nation. The questions that arise in the mind will not involve the value of doing these things, but the practicability of such a program.

CONGRESS MAKES THE FIRST MOVE.

To meet this objection I would recall to your attention the fact that all that I have urged is an extension on a large scale, and somewhat more elaborately, of just what this department has been doing for the past 16 years, through the activities of the Reclamation Service. And Congress has already taken the first step in the direction pointed out by appropriating $200,000 for an examination into the reclaimable land resources of the country, one half that sum to be expended for a survey of possible irrigation projects and the other half for an examination of those lands which need to be drained and of those huge tracts of lands which once were forests, but now are neither forest, pasture, nor farms, the logged-off lands of north, east, west, and south. As soon as this appropriation was made the country was divided into three zones and engineers were set at work gathering the data which Congress desired.

We are prepared to make report to Congress forthwith, giving a general picture of the extent and nature of these lands and advising as to the practicability of their reclamation. In the large it may be said that of these three classes of land we have a full 200,000,000 acres which may be converted into farms either by irrigation, drainage, or clearing.[1] These lands in greater part have passed out of the hands of the Government and are in private hands, though there are several of the largest bodies of lands needing drainage which are in the hands of the States. On the Government lands alone it would appear now to be unquestionably the fact that we could give employment to every man who would need work, and that almost immediately.

STATE COOPERATION.

But as this proposition has evolved I have found myself coming to the belief that it was not necessary to confine it to those States containing Government lands; that, on the contrary, it might fit in best with the sentiment of the country and to its greatest advantage

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[1] Although no complete survey has ever been made of our land resources, it is estimated that there are from 15,000,000 to 20,000,000 additional acres of at present arid land in the West for which water is available if properly conserved. There are, for example, half a million of acres in the Colorado River Basin, which need only irrigation to make them as fertile as the far-famed valley of the Nile.

By far the greater portion of our unused and unproductive lands, however, is comprised in the cut-over or logged off timber land lying largely within the eastern half of the United States. The approximate area of these cut-over lands, by States, is shown in the following table, which has been compiled from various sources of information, such as township, county, and State officials, lumber and logging companies, and individuals well-informed on this subject in their particular localities:

State.	Acres.	State.	Acres.
Alabama	14,785,000	New Jersey	1,151,000
Arkansas	13,893,000	New York	5,997,000
California	3,031,000	North Carolina	12,745,000
Florida	10,109,000	Oregon	3,537,000
Georgia	20,141,000	Pennsylvania	5,297,000
Idaho	676,000	South Carolina	8,994,000
Kentucky	3,222,000	Tennessee	7,833,000
Louisiana	11,877,000	Texas	12,936,000
Maine	6,135,000	Vermont	2,070,000
Maryland	1,848,000	Virginia	9,929,000
Michigan	11,686,000	Washington	3,330,000
Minnesota	14,022,000	West Virginia	4,634,000
Mississippi	13,203,000	Wisconsin	13,246,000
Missouri	8,900,000		
Montana	674,000	Total	228,509,000
New Hampshire	2,608,000		

In their present state these 228,509,000 acres of cut-over land are a picture of desolation calculated to discourage the hardiest pioneer. Only a vast area of stumps remains to mark the former forest, matted with underbrush and interspersed here and there with saplings. Perhaps as good an idea as any of the appearance of this waste land may be obtained from photographs of former forests which have been shattered by artillery fire. Yet when this land is cleared, leveled, and brought under the plow its soil, rich with the accumulated humus of hundreds of years, possesses extraordinary agricultural possibilities.

Lying also largely in the eastern half of the United States and overlapping the cut-over lands to some extent are some 80,000,000 acres of swamp lands. The approximate extent of these lands, by States, is shown in the table in the next column.

Where private enterprise has reclaimed small areas of swamp land, the wonderful productivity of the soil has been amply demonstrated.

Under present conditions the problem of reclaiming these vast areas of irrigable, cut-over, and swamp land could never be solved in its entirety by private enterprise. The if the plan were made adaptable to all the States, so that each State out of its unused lands might carve out farm settlements whereon, if they so chose, the soldiers returning to their home States could be located. By cooperation between the States and the Federal Government this can easily be effected. I have been surprised to discover how much land in the older States, such as Massachusetts and New York, for instance, there is that is unused, which once was tilled and which now, with modern methods of farm development and with the advantage of its nearness to the great markets, can be again profitably put to use. The commissioner of agriculture for Massachusetts has advised of land which, put under intensive cultivation, yielded last year more than $1,000 per acre net. And there are many thousand acres of such land. In New York land by the tens of thousands of acres has been deserted and is advertised

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huge items of labor and capital involved dwarf into insignificance any work of a similar character ever before undertaken. The great public works of the Reclamation Service and of the Panama Canal, for example, stimulating as they are to our national pride in achievement, fall far short of the possibilities involved in the plan of reclaiming an area one-fifth again as large as the State of Texas.

State.	Permanent swamp.	Wet grazing land.	Periodically overflowed.	Periodically swamp.	Total.
	Acres.	*Acres.*	*Acres.*	*Acres.*	*Acres.*
Alabama	900,000	59,200	520,000		1,479,200
Arkansas	5,200,000	50,000	531,000	131,300	5,912,300
California	1,000,000	1,000,000	1,420,000		3,420,000
Connecticut		10,000	20,000		30,000
Delaware	50,000	50,000	27,000	200	127,200
Florida	18,000,000		1,000,000	800,000	19,800,000
Georgia	1,000,000		1,000,000	700,000	2,700,000
Illinois	25,000	500,000	400,000		925,000
Indiana	15,000	100,000	500,000	10,000	625,000
Iowa	300,000	200,000	350,000	80,500	930,500
Kansas		59,380	300,000		359,380
Kentucky		100,000	300,000	44,600	444,600
Louisiana	9,000,000	1,196,605			10,196,605
Maryland	100,000		92,000		192,000
Maine	156,520				156,520
Massachusetts	20,000		39,500		59,500
Michigan	2,000,000	947,439			2,947,439
Minnesota	3,048,000	2,000,000		784,308	5,832,308
Mississippi	3,000,000		2,760,200		5,760,200
Missouri	1,000,000		1,439,700		2,439,700
Nebraska		100,000	412,100		512,100
New Hampshire	5,000		7,700		12,700
New Jersey	326,400				326,400
New York	100,000	100,000	329,100		529,100
North Carolina	1,000,000	500,000	500,000	748,160	2,748,160
North Dakota	50,000	50,000	50,000	50,000	200,000
Ohio			100,000	55,047	155,047
Oklahoma			31,500		31,500
Oregon	254,000				254,000
Pennsylvania			50,000		50,000
Rhode Island			6,000	2,064	8,064
South Carolina	1,500,000		622,120	1,000,000	3,122,120
South Dakota	100,000		511,480		611,480
Tennessee	639,600				639,600
Texas	1,240,000	1,000,000			2,240,000
Vermont	15,000		8,000		23,000
Virginia	600,000		200,000		800,000
Washington	20,500				20,500
West Virginia			23,900		23,900
Wisconsin	2,000,000			360,000	2,360,000
Total	52,665,020	6,826,019	14,747,805	4,766,179	79,005,023

by the State, which will produce apples and other fruits of fine quality, besides all the staple cereals and vegetables, but which does not attract as against the distant and alluring lands of the West, because it requires some systematic treatment.

Within 50 miles of the city of Washington, both in the States of Maryland and Virginia, there are large bodies of lands which once were parts of great plantations that can be had for less than any lands within the same distance of most of the larger cities of the West. The mind of the country has been turned toward the development of the raw lands, the free unbroken lands, to the neglect of opportunities nearer the center of the country's markets. In almost every southern State instances can be cited where white men under the wise direction of the Department of Agriculture support their families and make an excellent living upon small farms of from 10 to 30 acres. Yet between this city and New Orleans there are over 40,000,000 acres of unused lands.

THE NEW FARM IDEA.

No one, I believe, can make a study of this question without being convinced, as I have been, that this country can support a population of from three to four times that which we now have—if the people will give over their desire to congregate in industrial centers. The passion for the city is upon us. It has come from a variety of causes—the lack of society in the country, the distance between farm homes, the remoteness from the post office and the newspaper, the assumed superior status of the "city man," the desire for better school facilities for the children, and many more which have been the theme of books without number seeking to reestablish in the heart the longing for contact with the soil. But preachments of any kind will not offset stern repellant facts. There is but one way of dealing with this problem, and that is to answer the questions that are put by developing new conditions. We must turn, as Europe has in her centuries of experience, to the farm village, the settlement of farmers around a center which is their home, in which can be gathered most of the advantages of the city—the good school, the church, the moving picture, the well outfitted store—and these, with good roads, the rural express, the telephone, the automobile, and the post office will make life on the farm a thing of far different meaning from the isolated life it has been.

Of land, therefore, there is an abundance, land owned by the Government in the West and the South, land owned by private individuals in all the States, which is a burden to its owners and which can be had in great blocks at a very small price. It will not be for Congress to seek for advantageous places in which to locate these men; the difficulty will rather be in the choosing as between so many opportunities.

A POSSIBLE PROGRAM.

My own judgment would be that as an immediate program we should first offer an opportunity upon our present irrigation projects for all who wish work at clearing and leveling the land not now cultivated but for which water is available, or to which water can be brought under the present irrigation system, and that such tracts shall be developed under an appropriate land-settlement plan. This we can do at once and meet whatever labor problem may be immediate. As a second step I would urge an appropriation for one or more of the largest irrigation schemes for which surveys are in an advanced state. Concurrently it would seem to me wise to undertake the draining of the most promising projects—Government-owned land preferred, but, if privately owned, the land to be bought at an appraisement made by the Farm Loan Board and subject to the approval of the Department of Agriculture as to fertility of soil and desirability of location.

There is an alternative method of dealing with private lands which already has the approval of Congress, being incorporated in the reclamation act. Under this a private owner agrees to sell his land to whoever gets the water right at an appraised price as a condition precedent to our undertaking the construction of irrigation work. Under such a plan there would be no difficulty whatever in securing control of any-sized bodies of cut-over or swamp lands that might be desired; the Government would not buy the land, but the owner would look to the new settler for the price, and take it on such terms as the Government itself would exact for its own expenditure upon the land. Supplementing this there should be an opportunity given for the cooperation of all the States upon limited tracts which would be dealt with under State control and subject to the closest Federal supervision. This would be an adoption in the development of farms for soldiers of the method taken by Congress for the construction of national highways.

WORKING FOR A HOME.

With such a national program under way there need be no solicitude as to caring for the returned soldier. Before he left France he could be preparing for his work. More than one-third, probably nearer one-half, it is estimated, of the men who are in Europe have come from farms. They are not farm owners, many of them were farm hands, some of them tenant farmers. Those who thought of taking up this life as independent farmers under the most modern and approved system could be given an agricultural education while still in the foreign camps. Canada indeed is already at this work. Then after their return and when they have received the greetings of home, if the old position is not open or they wish to turn to an independent life, they can have their chance. For each there can be a position at the current rate of wages. The energy and the talent which he has been expending for an ideal and $30 a month he can now use to make a home for himself. There would be laid before him a number of projects which the Government had undertaken in the different sections of the country. Let us assume no more than three, one an irrigation scheme, another a drainage project, a third the development of a body of cut-over lands. The one would need to have great dams constructed to impound and divert waters, a hydroelectric plant, miles of canal and tunnel, perhaps, thousands of acres to be cleared and leveled, fenced and broken. This would mean years of work at good wages, work in the open under housing conditions that would seem palatial to the soldier of the trench, and at the end a piece of land on which would be erected a house and barn, a farm home in a group of farm homes. For this he must pay. But already he has received wages out of which he can have saved the necessary first installment on his place of 10 or 15 per cent. The balance with interest he can pay in 40 yearly installments, or earlier if he can. He should not be limited to a choice of farms upon the one project on which he works. If the life in Arizona, let us say, is not to his liking he can have the same opportunity after building the Arizona irrigated project to take up a farm upon another Government enterprise in South Carolina where men have drained the old rice swamps or in Wisconsin on a tract of what once was swamp but has been converted into rolling prairie farms.

Four things are the essence of this program—that there shall be work ready for the men on their return, that this work shall be for the making of America, that the money expended shall be returned with interest to the Government which advances it, and that the land shall be platted so as to be a part of an organized community. A farm as a going concern to be a part of a community that is a going concern—this is the ideal toward which we should work; and such settlements, a few of which already exist in Wisconsin, North Carolina, California, and elsewhere, should be the models for the future land developments of the country.

NO SLACKER LANDS.

There is one other feature which should be incorporated in any such scheme of land development—the acreage should be limited to that which will be sufficient to reasonably support a family. Revolutions come from great land holdings, and it should be the first policy of the Nation and the States to discourage in every way possible the gathering into one hand or a few hands large bodies of land. This is politically wise, socially and economically advisable. The spirit of a democracy does not thrive where men live without the hope of land ownership. There is something peculiarly subtle in the feeling that a bit of the soil is one's own. It makes for a stronger, higher citizenship. It gives birth to loyalties that are essential to national life and to a healthy home life.

To be able to say that a living is assured, no matter what one's opinion may be, is at the very center of the free life of a democracy. So these farms should not only be so small that they would not be speculative ventures in unearned increment, but they should be nontransferable to anyone holding any equally large tract of land in the same State. This will prevent their being aggregated in the course of years into great estates. To compel their use the owner might well be required to live on the land for five years before gaining sufficient title to make any transfer, and during the full period prior to the last payment three years of idleness should make the land subject to forfeiture to the Government upon repayment of the payments which have been made. This is not suggested as an infallible nor an ultimate plan, but it would save to the Government the opportunity to hold in its own hands the fate of these lands and see that they were made to serve. We wish no slacker lands. Enough land for a family, but not enough to make a new draft on the labor supply.

I have attempted here to give a broad sketch of a plan that has found favor generally as one that meets the needs of the moment and reaches far into the problems of our Nation. It is not a fixed program, the whole of which must be taken or rejected. It has the virtue of elasticity. So much of it as is needed can be used to meet the possibilities of the next few months or years. Once entered upon, its benefits and its defects will be made manifest.

THE COST.

How great will be the cost? As much as we wish to spend; as much as we need to spend. Less than many a strike has cost this country. Would it be unreasonable to ask for as much as we will spend this year for pensions to the veterans and their dependents of wars that ended 20 and 50 years ago? Would it be unreasonable to ask that we spend in the next two years on these veterans of the great war as much as it cost us to conduct that war for a single week? Would a people that gave out of hand, out of a noble sense of charity to quasi public organizations, $500,000,000 for the entertainment and care of these boys hesitate to buy the bonds of this country for a like amount to provide peace work, home work, and homes for these same boys, who will ask the question, What is to be my chance? A loan! Not a gift this time! A loan on interest. Those who deal in money tell me that this can be done. But be the amount great or small, the plan can be made to fit our needs—raise it as you please, by taxes or by a bond issue (a mortgage on the very land that it reclaims)—is there a better way to insure the future than to direct these strong-armed, big-chested soldier men into a battle against the wanton wastefulness of nature?

We have spent largely for this war and largely we must spend for many years to come. We are to economize that we may meet our debts; this must be the national policy. But to stop growth is not economy. To stand paralyzed in the presence of a debt is to become its victim. England is planning in the hundreds of millions of pounds sterling for housing and land schemes. Canada with less than 7,000,000 people is offering to each man 160 acres of land and $2,500 with which to improve it. Surely the United States, which has escaped with so slight a comparative loss in life, will not do less. There is one way to pay out, and that is by harder work and more faith. These are the reasons for our self-confidence. We shall coin work and faith into new wealth and make the new wealth meet the debts. This has been our policy from the first in all great enterprises. To waste is not sound economy; to save is; but sounder still is the economy that invests to create; this is the sowing of seed. And this land is yet but in its infancy. It has 2,000 years to run before it reaches the age of that country which still holds Verdun and is planning now the reconstruction of 350,000 homes destroyed by the invader.

There can be no surer insurance for the Nation than to put its men upon the soil, and there can be no wiser investment that a nation can make than to add to its territory by taking from desert and waters and desolation land that is now useless. Nations make war upon each other that they may have new lands—lands in tropical Africa, in remote Asia. They spend life and go deeply into debt that they may gain small domains already filled with an unprogressive people. And here, under our own flag, we have land as rich as the Valley of the Nile, not ours yet, for it does not serve us, which we can conquer with a little thought and the lending of a little money. This is conquest worthy of a democracy, giving free men their chance to make themselves economically free without the shedding of blood or the breaking of hearts.

AMERICA'S CHALLENGE.

I wish now to turn to the consideration of that other phase of Americanization to which I earlier referred—the need for a larger sense of our responsibility as Americans, both in view of the greater part which this Nation is destined to play in the world's affairs and in view of our manifest obligations at home; and to urge that we make a fresh and strong demand upon the schools of the country to meet the needs of the day that has come, to give inspiration to a wider Americanism and capacity for it.

America threw the world into a daring maze of possibilities by its entrance into this war upon lines more idealistic than any other national venture in history. And in doing this we challenged the world to a contest for supremacy, not upon the field of battle but in the much larger field of intellectual, moral, and social leadership. Whether we can make good before the world depends upon our willingness and our ability to see the problems that we must meet and our will to meet them forehandedly. For clearly our right to world leadership in the new day is not to be measured by the number of men who have gone to France or the things they have done, but by the use we now and from this time forward make of the freedom we have secured for ourselves and others.

The world has taken us at our word. We said that the institutions which we enjoyed were those which the world should enjoy, for they were based upon rights inherent in man. We announced ourselves as coming to the rescue of imperiled democracies, and as the war progressed we came to the point where we would discuss peace only with those whose government, like our own, came from the people. Beaten upon land and frustrated upon sea, those sole surviving autocracies with which we fought broke into fragments before the mandate of an idea, and the map of Europe changed more in a few days than it had changed in centuries. The aggregating process which had gone on throughout many hundreds of years, and which had been deemed essential to national self-protection, was not only stayed but set at naught, and nations fell into pieces like a child's picture puzzle, to be replaced in the general picture along lines of racial desire and a common culture. This is an unprecedented thing in history. Enemy nations came to an "about face," professing themselves converts to the new faith, willing pupils in a new school. Thus out of an international struggle which we entered upon unwillingly we find ourselves emerging with a greater burden of national responsibility and a larger sense of the meaning of America—America as a leader in a world of democracies, if not a world democracy.

NEW RESPONSIBILITIES.

What change in national policies is involved in this world change? Who are these reborn racial groups who now come forward to their places at the family table? What is our duty toward them and upon what are they to live? What economic independence is essential to national existence? To what extent are we trustees for other peoples? What national purposes have we that should be made secure by international pact or union? Such questions go deep into problems to which even the ripest statesmen have in the past given little thought. And how much less the great body of the people! Yet now it is the duty of the American citizen to know of these things; to talk of them, as a process of whipping his own choatic notions into shape; to project himself into a world where all horizons are new. While yet we may hardly be said to have learned to think nationally, we are compelled to give serious concern to the affairs of people of whom we had not heard four years ago. Most removed and isolated of all nations, living on and to ourselves, America has overnight moved into the center of the world's stage and become subject to every scrutinizing and critical eye. This is a test for all that we have of dignity and wisdom.

A wholesale challenge has been given as the result of our own idealism—how now may we meet it? Clearly we must set about making ourselves adequate to think in the larger terms of this greater life. Yet we must hold fast to that which makes possible any such broad conception—the ability of men and women to live together under the proved form of our own Government. To think in terms of many democracies or of mankind, we must work in terms of America. For all thought of making good in a greater sphere must be checked, qualified, and limited by our capacity to prove ourselves first of all strong and capable and purposeful at home. Our international value depends upon our national strength, unity, and vision. And this in turn must in a democracy rest upon the intelligence, the capabilities, and the character of the individuals who make the Nation.

Now, the question that we must put to ourselves is: Are we doing all that can be done to develop these?

Our war experience has taught us, among many things, the value of a strong national spirit, the vital importance of national ideals, the impotence of ignorance, the dependence of this modern world upon skilled men and organizing ability, the need for and the possibilities that lie in the extension of cooperative effort of all kinds. Are we making full use of the facilities that we have for the promotion of these ends? Are we making out of America as a growing crop all that might reasonably be expected or that is demanded by our position in the world?

AMERICA IN 1918.

The vitality of this question was put strongly to the Nation during the past year in a form that was not altogether agreeable. For the draft revealed the astonishing percentage of those in this country much in a year as we have gloriously spent in five hours in France, and the work could be done. It could be done without coercion, without trenching on the prerogatives of the State in the slightest. If we could offer help to those willing to accept it, the end would be accomplished. Make the same kind of an offer to the States for the education of their illiterates that we make to them for the construction of roads, and in five years there would be few, if any, who could not read and write in this country. It may be worth while to consider some of the groups that, taken together, constitute the problem.

NATIVE-BORN WHITES.

Adult illiteracy in the less-developed sections of our country is not a proud matter of which to talk, but it is present. Men who speak in the language of Shakespeare—and this is literally true, for their ancestors came here in his time bringing the language of Shakespeare and the King James version of the Bible on their tongues—tens of thousands of these men and women are to-day, after three centuries in this country, unable to read one line of Shakespeare or to sign their names. And yet they have fought for this country through every war and have died as heroes for a land that did not concern itself enough about them to see that they were educated. Those people have not had their chance. Their condition is a reproach to a republic. And it is not that they are unwilling to take instruction, or that they feel superior to it. For the experiment has been made; and, day after day, old, gray-bearded men and eager-eyed women went to the mountain schools when given the opportunity, and their letters tell of the delight that is theirs because the world has been opened to them.

And the children of these American-born people of Anglo-Saxon stock—what of them? Are they to be left to burrow their way through the darkness—one out of a thousand, perhaps, emerging to the opportunities of a railroad brakeman or a skilled mechanic after a splendid struggle against the handicap of early ignorance? These boys are expected to vote, and to vote wisely for those who shape not only the destinies of their own land, but, as we now see, for those who are to mold the lives of many peoples. Are they to vote without knowing that such new nations exist—without the ability to read the names on a map or the text of a treaty? This would seem to be challenging too strongly the protecting hand of a patient Providence.

THE NEGRO.

Then, we must consider the negro. For him and his condition we are responsible as for no one else. He came here without exercising his own will. He was made a citizen without discrimination and in a large out-of-hand way. The Indian we feel we are responsible for as a Nation, and we give him an education—a most practical one. But the Negro, who is a charge upon the American conscience and whose education, I believe, should long ago, in some part, at least, have been a charge upon the American pocket, is slowly, very slowly, coming into that knowledge which is his one chance of developing into a growing national asset—the knowledge of the way of making a living. When one looks into the effort that is being made to give the Negro the right sort of an education, he finds a much more cheerful picture than he had thought. The Southern States, for instance, are meeting with no little eagerness the offers that come to them to give some direction to the education of the negro. The problem is basically one of money. The way has been found to give our colored citizen an education that will strengthen his fiber, widen his vision, and at the same time make him happy in achieving a useful place in society. There are no more inspiring and promising reports written in this country than those of the various foundations which are promoting the right method of educating the Negro. Not only is the response from the States encouraging, but experience has gone far enough forward by this time to demonstrate that with guidance, oversight, and the bearing of only a part of the financial burden, this whole problem of lifting a backward people onto a level more compatible with our hopes for them and with their status as citizens can be realized. Still, this Nation may learn what education will do for an undeveloped race by the study of its own work in the far-off Philippine Islands.

THE FOREIGN BORN.

The next grand division of those who need education, inspiration, and outlook, and for whom we are responsible, is the foreign born. Our responsibility arises out of our generosity. These sons and daughters of all the world have been drawn here by the generosity of our laws; the open hand has been extended across the seas. We have said to them that coming clean they would be welcome. This was the land of their heart's desire, where men could be their own masters and rise according to the quality that they had. Here was youth with which they could identify themselves, land which they could own, society of which they could become an integral part, political life which they could help to shape and in which they would have satisfied that world-long yearning for recognition. The man could here be developed, the full man, for schools were here and a sympathetic environment; others were climbing, too, with whom they could measure their progress. This was a fair picture surely. And they came, some for economic reasons, desiring their chance at the good things spread on this rich table that Columbus found. Others came that they might have the larger satisfactions of an independent, unhampered, unmastered growth as men among equals. They came in no apologetic humor, for they brought something from the older lands which they felt would be a contribution to a new civilization—their art, literature, their far-reaching historical perspective, their fervor for the opportunity to experiment, to adventure, to give a cast to this new world's life.

Here was an opportunity. We met them at the gate with a truly American welcome, which most of them could not understand: "Enter and make a place for yourself." This had been the greeting we ourselves had received. There was to be no coddling here. This was a man's land, a place of test. The art that was most needed was the art of getting on. If literature and science and experiment were to come they must be founded upon the solid rock of a self-sustained, unpatronized people. Dreams of ease and long debate must be cast aside until the right to dream was earned. The American was to be a journeyman, doing his bit at the making of the land. If this was not a worth-while job, then there was no place for the stranger. We had mines to dig, wells to drill, buildings to erect, railroads to construct, farms to plow, sewers to lay, machines to build, and when one had done his share of these there might come the singing. The Lord had laid on us the responsibility of reclaiming for mankind a large slice of this lost land, and all else could wait in life till this end was reached. In this steady drive we made ourselves. We were impatient with those who called out to stop or go slow. The pace that we set was that which must be kept. "All men are born free and equal," we called to the newcomer, and went on, forgetful that he was not free, for he had still the limitations of his old life, nor equal, for many reasons. Manifestly a man without tools is not the equal of the man with, and those here already were men who knew the language of the new land, who knew its spirit and the way to meet it and run with it, who had access to the heart of a people and knew what its call was. Things did not lie obvious before the eye like a seam of coal on a naked hillside. This new land was a hunting ground, and those who knew the favorite cover and could blend most quietly into the landscape found themselves best at the game.

THE NEWCOMER'S DILEMMA.

So this is America! A scramble for a living! Much to see. but no one to interpret it all. So thought this new American. Then the padrone came forward as a savior. Life was not to go out anyway. And, with others in like situation, possibly from his own country, equally ignorant, equally handicapped, the new American starts his life. It takes a brave and a very ambitious man to lift himself out of such an environment. Easily he becomes a victim to the shrewd, predatory padrone or boss. He falls into debt and becomes mortgaged to ignorance and squalor for years. His ideal of America has suffered a change. "And is this freedom?" he says to himself, as with tired back he bends to his work, without hope that the burden will be lighter to-morrow. He can not read the signs which warn him of danger. He can not read of the opportunities which city and country o[illegible]. In his own land perhaps he had no chance to learn in his o[illegible]ongue. In this new land he is too tired, too hesitant to learn t[illegible] strange, difficult tongue. Is it any wonder if to this dissatisfied stranger the voice of one who speaks to him in the language of home has authority and carries far? And if this voice preaches discontent, and violent discontent, as the one sure path to better days, is it strange that he should listen? Who are the men who master this new world? Plainly the ones he knows, from whom he has suffered. Do these same men control everything; are there no sweet places of refuge? He can find no one to make him see the greater America. The whole of this continent is to him the cramped apartment, the dirty street, and the sweatshop or the factory. To the sweep of the great land and its many beckonings his eyes are closed. And in his isolation and ignorance and disappointment there is fruitful nesting place for all the hurtful microbes that attack society.

REASONS FOR AMERICANIZATION.

This man is our charge. He needs and deserves care, solicitude, thoughtful consideration. Ignobly put—it will pay. More manfully said—it is our duty. Worthily—it is our opportunity.

Economically that man is a potential asset which we should not waste. Give him a glimpse into the philosophy which underlies our struggle and he will turn into a cheerful, strong fellow worker in the making of America, as have all the rest who have preceded him. It is money in our pockets that he should be able to care for himself; that he should know our language; that his body shall be well nourished and his mind hopeful. So much for the purely selfish side.

As to our duty, it grows out of our loyalty to ourselves, *noblesse oblige*. But we may look beyond these and find a finer reason for doing all in our power to reveal America to this man. He is a human being whom we can help to a truer view of that which we have said before the world was the most stimulating, invigorating, developing of all atmospheres, that of freedom. And the test of our democracy is in our ability to absorb that man and incorporate him into the body of our life as an American. He will learn to play the game, to stand to the challenge that makes Americans; the unfostered, self-sufficiency of the man who knows his way and has learned it by fighting for it will yet be his. And we will learn from him the viewpoint of those peoples who now are wrestling with all their new-found strength and weakness to realize long-nurtured hopes. If we are to deal wisely in this larger day we must get within that man and look out with his eyes not only upon this country but upon the land from which he came, for has not America become as a foster mother to these strugglers?

METHODS.

First of all, the hand of friendship for that new American, the voice of a friend who shall be an unselfish adviser, a guide in this strange land of troubles, small and large, but equally incomprehensible. Then the school, the night school, or if not that, the shop school. And with these the community center, the gathering place that represents all America.

This is a program that has been well thought out. It has been tried out in a small way and found successful. It needs but nurturing to develop into a plan that will make the word "Americanization" one of exceptional pride. For this plan the great cities of the country, where mostly our foreign born have congregated, are ready. For it the industries, the business men, are ready. I am warranted in the statement that all the largest industries in the land will from their own time offer an opportunity for an elementary education to every foreign-born man or woman in their employ. Some are willing to furnish the teacher if one competent for this class of work can be found. If the Government will shape the policy and undertake to make the propaganda for this definite end of giving a first insight into American words, newspapers, politics, life, that which has been regarded as the work of generations can be started in a very short time and men put on their way toward real citizenship.

I am not urging the absurdity that men can be transformed into Americans by a course in school. This is but a beginning. Knowledge of our language is but a tool. America is the expression of a spirit, an attitude toward men and material things, an outlook, and a faith. Our strange and successful experiment in the art of making a new people is the result of contact, not of caste, of living together, working together for a living, each one interpreting for himself and for his neighbors his conception of what kind of social being man should be, what his sympathies, standards, and ambitions should be.

Now, this can not be taught out of a book. It is a matter of touch, of feeling, like the growth of friendship. Each man is approachable in a different way, appealed to by very contradictory things. One man reaches America through a baseball game, another through a church, a saloon, a political meeting, a woman, a labor union, a picture gallery, or something new to eat. The difficulty is in finding the meeting place where there is no fear, no favor, no ulterior motives, and, above all, no soul-insulting patronage of poor by rich, of black by white, of younger by elder, of foreign born by native born, of the unco' bad by the unco' good. To meet this need the schoolhouse has been turned into a community center. It is a common property, or should be. All feel entitled to its use. When we were younger this kind of machinery was not necessary, for we were fewer in number, lived in smaller communities, and felt a common interdependence which made each one a trumpet blowing herald of democracy. To-day, however, there must be some thought given and some money expended in even having an opportunity to touch the hand of a fellow man.

I believe that more and more thought will be given to our school system as the most serviceable instrumentality we possess for the development of a better America. It has been, we must confess, a very much taken-for-granted institution. It is probably of all our inventions the one of which we are most proud, and like other of our inventions we have not realized the greatness of its possibilities. We have become accustomed to hearing it spoken of as the heart of the Nation. But this figure must be taken with very definite limitations. It is the beginning of things for the boys and girls, but to the man and the woman it is almost a thing outside of life. This should not be so, for it may be the very center of the social, the intellectual, and in smaller places of the economic life. This is so, in fact, in Switzerland and in Denmark, and is becoming so in many places in our country.

To the necessity for more thorough education of the people all countries have become keenly alive. One large part of England's grand plan of reconstruction is the founding and conducting of a great national school system out of which will come more men and women of trained minds and trained hands.

As we move further and further from the war we will discover much that we do not now see. But this one thing stands out more plainly than ever before, that this world is to belong to the workers those who do and those who direct the doing. Not merely to those who drive the nail or lay the brick, but also to those who have come to a higher capacity through education and larger experience, the men of scientific knowledge, of skill in the arts, of large organizing capacity. Ease, sheltered repose, will come only to those who themselves have earned it. This is the inevitable tendency of democracy.

This thought is not new to America, it is American, for here we have climbed the rough road of experience together, each jostling the other and pushing the weak ones aside. To the swift and to the strong there will always come the premiums, but to the cunning and to the greedy there will be given less and less of opportunity.

The test is to be in peace as it was in the time of war. Are you fitted for the fight? The man who knew how knowledge could be converted into power was the man for whom there was unlimited call. So it is increasingly to be. To be useful is to be the test that society will put. Each man's rights are to be measured not by what he has but by what he does with what he has. The honors—the *croix de paix*—the richest rewards will go to the capables, those who are not standardized into "men machines," those who dare to venture and learn to lead. But all must work, and this duty to work and respect for work should be the earliest lesson learned. And it should be taught in the school, not as a homily but in a living way, by tieing work with instruction, making the thing learned to apply to something done. I should like to see the day when every child learned a trade while at school, trained his mind and his hand together, lifted labor into art by the application of thought.

To be useful is the essence of Americanism, and against the undeveloped resource, whether it be land or man, the spirit of this country makes protest.

Respectfully, yours,

FRANKLIN K. LANE,
Secretary.

The PRESIDENT.

LETTER TO THE PRESIDENT ON FARMS FOR RETURNING SOLDIERS.

MAY 31, 1918.

I believe the time has come when we should give thought to the preparation of plans for providing opportunity for our soldiers returning from the war. Because this department has handled similar problems, I consider it my duty to bring this matter to the attention of yourself and Congress.

Every country has found itself face to face with this situation at the close of a great war. From Rome under Cæsar to France under Napoleon, down even to our own Civil War, the problem arose as to what could be done with the soldiers to be mustered out of military service.

At the close of the Civil War America faced a somewhat similar situation, but, fortunately, at that time the public domain offered opportunity to the home-returning soldiers. The great part the veterans of that war played in developing the West is one of our epics. The homestead law had been signed by Lincoln in the second year of the war, so that out of our wealth in lands we had farms to offer the million of veterans. It was also the era of transcontinental railway construction. It was likewise the period of rapid, yet broad and full, development of towns and communities and States.

To the great number of returning soldiers land will offer the great and fundamental opportunity. The experience of wars points out the lesson that our service men, because of army life, with its openness and activity, will largely seek out-of-doors vocations and occupations. This fact is accepted by the allied European nations. That is why their programs and policies of relocating and readjustment emphasize the opportunities on the land for the returning soldier. The question, then, is, "What land can be made available for farm homes for our soldiers?"

We do not have the bountiful public domain of the sixties and seventies. In a literal sense, for the use of it on a generous scale for soldier farm homes as in the sixties, "the public domain is gone." The official figures at the end of the fiscal year June 30, 1917, show this: We have unappropriated land in the continental United States to the amount of 230,657,755 acres. It is safe to say that not one-half of this land will ever prove to be cultivable in any sense. So we have no land in any way comparable to that in the public domain when Appomattox came and men turned westward with Army rifle and "roll blanket" to begin life anew.

While we do not have that matchless public domain of '65, we do have millions of acres of undeveloped lands that can be made available for our home-coming soldiers. We have arid lands in the West; cut-over lands in the Northwest, Lake States, and South; and also swamp lands in the Middle West and South, which can be made available through the proper development. Much of this land can be made suitable for farm homes if properly handled. But it will require that each type of land be dealt with in its own particular fashion. The arid land will require water, the cut-over land will require clearing, and the swamp land must be drained. Without any of these aids, they remain largely "No man's land." The solution of these problems is no new thing. In the admirable achievement of the Reclamation Service in reclamation and drainage we have abundant proof of what can be done.

Looking toward the construction of additional projects, I am glad to say that plans and investigations have been underway for some time. A survey and study has been in the course of consummation by the Reclamation Service on the Great Colorado Basin. That great project, I believe, will appeal to the new spirit of

America. It would mean the conquest of an empire in the Southwest. It is believed that more than 3,000,000 acres of arid land could be reclaimed by the completion of the Upper and Lower Colorado Basin projects.

It has been officially estimated that more than 15,000,000 acres of irrigable land now remain in the Government's hands. This is the great remaining storehouse of Government land for reclamation. Under what policy and program millions of these acres could be reclaimed for future farms and homes remains for legislation to determine. The amount of swamp and cut-over lands in the United States that can be made available for farming is extensive. Just how much there is has never been determined with any degree of accuracy. Practically all of it has passed into private ownership. For that reason, in considering its use, it would be necessary to work out a policy between the private owners and the Government unless the land was purchased. It has been estimated that the total area of swamp and overflowed lands in the United States is between seventy and eighty million acres. Of this amount it is stated that about "60,000,000 acres can be reclaimed and made profitable for agriculture." The undeveloped swamp lands lie chiefly in Florida, in the States along the Atlantic and Gulf coasts, in the Mississippi Delta, and in Missouri, Indiana, Michigan, Minnesota, Wisconsin, and California.

What amount of land in its natural state unfit for farm homes can be made suitable for cultivation by drainage only thorough surveys and studies can develop. We know that authentic figures show that more than 15,000,000 acres have been reclaimed for profitable farming, most of which lies in the Mississippi River Valley.

The amount of cut-over lands in the United States, of course, it is impossible even in approximation to estimate. These lands, however, lie largely in the South Atlantic and Gulf States, the Lake States, and the Northwestern States. A rough estimate of their number is about 200,000,000 acres—that is, of land suitable for agricultural development. Substantially all this cut-over or logged-off land is in private ownership. The failure of this land to be developed is largely due to inadequate method of approach. Unless a new policy of development is worked out in cooperation between the Federal Government, the States, and the individual owners, a greater part of it will remain unsettled and uncultivated. The undeveloped cut-over lands lie chiefly in the Pacific Northwest (particularly in Washington and Oregon), in the Lake States (Minnesota, Michigan, and Wisconsin), and in the South Atlantic and Gulf Coastal States (Virginia, North Carolina, South Carolina, Georgia, Florida, Alabama, Mississippi, Louisiana, and Texas).

Any plan for the development of land for the returning soldier will come face to face with the fact that a new policy will have to meet the new conditions. The era of free or cheap land in the United States has passed. We must meet the new conditions of developing lands in advance—security must, to a degree, displace speculation. Some of the defects in our old system have been described by Dr. Elwood Mead in these words:

> Science [should] have gone hand in hand with the settlement of the arid and semiarid country, and all that science could give would have been utilized, first, in the creation of the conditions of settlement, and then in aiding the settler in difficult tasks. Because nothing was done, these heroic but uninformed souls were bedeviled by the winds, cold, drought, and insect pests. They wasted their efforts, lost their hopes and ambitions, and a tragic percentage left, impoverished and embittered. The tragic part of this history is that nearly all this suffering and loss could have been avoided under a carefully thought-out plan of development.

There are certain tendencies which we ought to face frankly in our consideration of a policy for land to the home-coming soldier. First, the drift to farm tenancy. The experience of the world shows without question that the happiest people, the best farms, and the soundest political conditions are found where the farmer owns the the home and the farm lands. The growth of tenancy in America shows an increase of 32 per cent for the 20 years between 1890 and 1910. Second, the drift to urban life. In 1880 of the total population of the United States 29.5 per cent of our people resided in cities and 70.5 per cent in the country. At the census of 1910, 46.3 per cent resided in cities and 53.7 per cent remained in the country. It is evident that since the war in Europe there has been a decided increase in the trend toward the city, because of industrial conditions. The adoption by the United States of new policies in its land development plans for returning veterans will also contribute to the amelioration of these two dangers to American life.

A plan of land development, whereby land is developed in large areas, subdivided into individual farms, then sold to actual bona fide farmers on a long-time payment basis, has been in force not only in the United States under the reclamation act, but also in many other countries for several years. It has proved a distinct success. In Denmark, Ireland, New Zealand, and the Australian Commonwealth it has completely changed the land situation. One of the new features of this plan is that holders are aided in improving and cultivating the farm. In a word, there is organized community development. Its beneficial results have been well described by the Canadian commission which was appointed to investigate its results in New Zealand in these words:

> * * * the farmers have built better houses or remodeled their old ones, brought a larger acreage of land under cultivation that would otherwise be lying idle; have bought and kept better live stock; have bought and urged more labor-saving machinery on the farms and in the houses. * * * They keep

more sheep and pigs and have so largely increased the revenue from their farms that they are able to meet the payments on the mortgages and to adopt a higher standard of living and a better one. Throughout the country a higher and better civilization is gradually being evolved; the young men and women who are growing up are happy and contented to remain at home on the farm and find ample time and opportunity for recreation and entertainment of a kind more wholesome and elevating than can be obtained in the cities.

It may be said that this country outside of Alaska has no frontier to-day. Of course, Alaska will still offer opportunity for a pioneer life. And, of course, Alaska likewise has yet unknown remarkable agricultural possibilities, but unless we make possible the development of this land by the men who desire their life in that field, we will lose a great national opportunity.

This is an immediate duty. It will be too late to plan for these things when the war is over. Our thought now should be given to the problem, and I therefore desire to bring to your mind the wisdom of immediately supplying the Interior Department with a sufficient fund with which to make the necessary surveys and studies. We should know by the time the war ends, not merely how much arid land can be irrigated, nor how much swamp land reclaimed, nor where the grazing land is and how many cattle it will support, nor how much cut-over land can be cleared, but we should know with definiteness where it is practicable to begin new irrigation projects, what the character of the land is, what the nature of the improvements needed will be, and what the cost will be. We should know also, not in a general way, but with particularity, what definite areas of swamp land may be reclaimed, how they can be drained, what the cost of the drainage will be, what crops they will raise. We should have in mind specific areas of grazing lands, with a knowledge of the cattle which are best adapted to them, and the practicability of supporting a family upon them. So, too, with our cut-over lands. We should know what it would cost to pull or "blow out" stumps and to put the lands into condition for a farm home.

All of this should be done upon a definite planning basis. We should think as carefully of each one of these projects as George Washington thought of the planning of the city of Washington. We should know what it will cost to buy these lands if they are in private hands. In short, at the conclusion of the war the United States should be able to say to its returned soldiers: "If you wish to go upon a farm, here are a variety of farms of which you may take your pick, which the Government has prepared against the time of your returning." I do not mean by this to carry the implication that we should do any other work now than the work of planning. A very small sum of money put into the hands of men of thought, experience, and vision will give us a program which will make us feel entirely confident that we are not to be submerged industrially or otherwise by labor which we will not be able to absorb, or that we would be in a condition where we would show a lack of respect for those who return as heroes, but who will be without means of immediate self-support.

A million or two dollars, if appropriated now, will put this work well under way.

This plan does not contemplate anything like charity to the soldier. He is not to be given a bounty. He is not to be made to feel that he is a dependent. On the contrary, he is to continue in a sense in the service of the Government. Instead of destroying our enemies he is to develop our resources.

The work that is to be done, other than the planning, should be done by the soldier himself. The dam or the irrigation project should be built by him; the canals, the ditches, the breaking of the land, and the building of the houses should, under proper direction, be his occupation. He should be allowed to make his own home, cared for while he is doing it, and given an interest in the land for which he can pay through a long period of years, perhaps 30 or 40 years. This same policy can be carried out as to the other classes of land. So that the soldier on his return would have an opportunity to make a home for himself, to build a home with money which we would advance and which he would repay, and for the repayment we would have abundant security. The farms should not be turned over as the prairies were—unbroken, unfenced, without accommodations for men or animals. There should be prepared homes, all of which can be constructed by the men themselves and paid for by them under a system of simple devising by which modern methods of finance will be applied to their needs.

As I have indicated, this is not a mere Utopian vision. It is, with slight variations, a policy which other countries are pursuing successfully. The plan is simple. I will undertake to present to the Congress definite projects for the development of this country through the use of the returned soldier by which the United States, lending its credit, may increase its resources and its population and the happiness of its people with a cost to itself of no more than the few hundred thousand dollars that it will take to study this problem through competent men. This work should not be postponed.

LETTER TO THE PRESIDENT ON ADULT ILLITERACY.

MARCH 14, 1918.

I believe that the time has come when we should give serious consideration to the education of those who can not read or write in the

United States. The war has brought facts to our attention that are almost unbelievable and that are in themselves accusatory. There are in the United States (or were when the census was taken in 1910) 5,516,163 persons over 10 years of age who were unable to read or write in any language. There are now nearly 700,000 men of draft age in the United States who are, I presume, registered who can not read or write in English or in any other language.

Over 4,600,000 of the illiterates in this country were 20 years of age or more. This figure equals the total population of the States of California, Oregon, Washington, Montana, Idaho, Wyoming, Colorado, Utah, Nevada, Arizona, New Mexico, and Delaware. The percentage of illiterates varies in the several States from 1.7 per cent in Iowa to 29 per cent in Louisiana. More than 10 per cent of it was in 13 States. Half of the illiterates were between 20 and 45 years of age. It has been estimated by one of those concerned with this problem that if these five million and a half illiterate persons were stretched in a double line of march at intervals of 3 feet and were to march past the White House at the rate of 25 miles a day it would require more than two months for them to pass. Over 58 per cent are white persons, and of these 1,500,000 are native-born whites.

I beg you to consider the economic loss arising out of this condition. If the productive labor value of an illiterate is less by only 50 cents a day than that of an educated man or woman, the country is losing $825,000,000 a year through illiteracy. This estimate is no doubt under rather than over the real loss. The Federal Government and the States spend millions of dollars in trying to give information to the people in rural districts about farming and home making. Yet 3,700,000, or 10 per cent, of our country folk can not read or write a word. They can not read a bulletin on agriculture, a farm paper, a food-pledge card, a liberty-loan appeal, a newspaper, the Constitution of the United States, or their Bibles, nor can they keep personal or business accounts. An uninformed democracy is not a democracy. A people who can not have means of access to the mediums of public opinion and to the messages of the President and the acts of Congress can hardly be expected to understand the full meaning of this war, to which they all must contribute in life or property or labor.

It would seem to be almost axiomatic that an illiterate man can not make a good soldier in modern warfare. Until last April the Regular Army would not enlist illiterates, yet in the first draft between 30,000 and 40,000 illiterates were brought into the Army, and approximately as many near illiterates.

They can not sign their names.

They can not read their orders posted daily on bulletin boards in camp.

They can not read their manual of arms.

They can not read their letters or write home.

They can not understand the signals or follow the Signal Corps in time of battle.

There are 700,000 men who can not read or write who may be drafted within our Army within the next year or two. Training camps for soldiers are not equipped for school work, and the burden of teaching men to read the simplest English should not be cast upon the officers or others in the camps. We should give some education to all our men before they enter the Army.

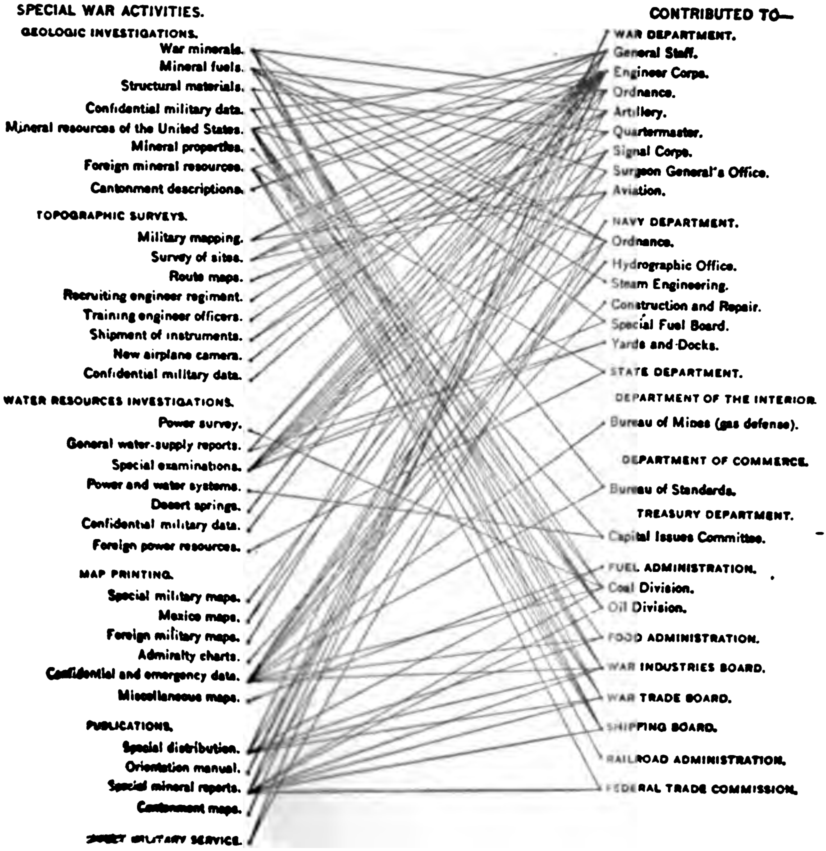
There is even a larger problem than this that challenges our attention, and that is the teaching of the English tongue to millions of our population. Dr. John H. Finley, president of the University of the State of New York, in a recent speech presented this picture which he found in one of the cantonments:

> How practical is the need of a language in this country common to all tongues is illustrated by what I saw in one of the great cantonments a few nights ago. In the mess hall, where I had sat an hour before with a company of the men of the National Army, a few small groups were gathered along the tables learning English under the tuition of some of their comrades, one of whom had been a district supervisor in a neighboring State and another a theological student. In one of those groups one of the exercises for the evening consisted in practicing the challenge when on sentry duty. Each pupil of the group (there were four of Italian and two of Slavic birth) shouldered in turn the long-handled stove shovel and aimed it at the teacher, who ran along the side of the room, as if to evade the guard. The pupil called out in broken speech, "Halt! who goes there?" The answer came from the teacher, "Friend." And then, *in as yet unintelligible English* (the voices of innumerable ancestors struggling in their throats to pronounce it), the words "Advance and give the countersign." So are those of confused tongues learning to speak the language of the land they have been summoned to defend. What a commentary upon our educational shortcomings that in the days of peace we had not taught these men, who have been here long enough to be citizens (and tens of thousands of their brothers with them), to know the language in which our history and laws are written and in which the commands of defense must now be given! May the end of this decade, though so near, find every citizen of our State prepared to challenge, in one tongue and heart, the purposes of all who come, with the cry, "Who goes there?"

What I have said here leads to a respectful request that you give early consideration to House bill 6490, which provides for a modest appropriation for the Bureau of Education to begin and conduct a vigorous and systematic campaign for the eradication of adult illiteracy. If the bill can be passed soon, special attention can be given to teaching illiterate men of draft age, and especially those who are classified in class A.

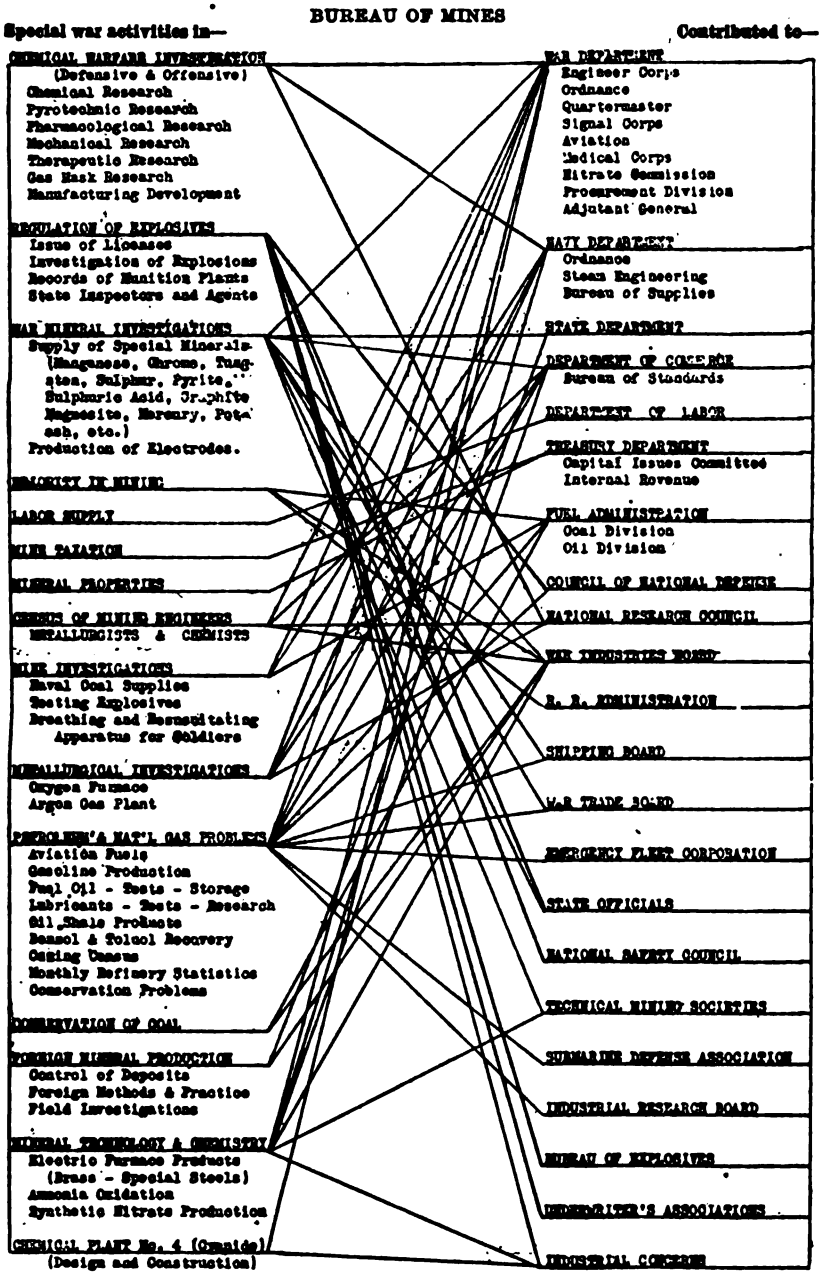
DEPARTMENT OF THE INTERIOR.

GEOLOGICAL SURVEY.



DEPARTMENT OF THE INTERIOR.

BUREAU OF MINES



NOTE.—Chemical Warfare Investigation transferred to War Department June 25, 1918.

ADMINISTRATIVE EFFORT.

THE GENERAL LAND OFFICE.

1. Allowed during the fiscal year, original entries of Indian and public lands, an area of 9,974,331.61 acres.

2. Patented during the fiscal year, 9,552,482.21 acres.

3. Collected from all sources during the year, $5,431,827.66, and expended during the same period in the public-land service, $2,948,360.92, leaving a net surplus of $2,483,466.74 of receipts over expenditures.

4. Collected and turned into the United States Treasury as a result of the work of the field service, $118,916.01.

5. Restored to the public domain 99,038 acres as the result of field investigation.

6. Secured, as escrow deposits, under contracts entered into with oil land claimants under the act of August 25, 1914 (38 Stat., 708), up to the end of the fiscal year, $3,491,544.90.

7. Approved and accepted surveys and resurveys for an area of over 11,000,000 acres, an excess of 1,000,000 acres over the work of the previous year and the third largest output for the last six years.

8. Reduced, by the introduction of more efficient methods, the cost of office work on the public-land surveys in the offices of the surveyors general 61 cents per mile, with a like reduction on mining claims and miscellaneous work.

9. Offered 25 leasing blocks of coal lands in the Nenana coal field, Alaska.

10. Secured a coal lease in the Bering River field, Alaska, covering an area of 2,420 acres.

11. Examined as to their validity 49,419 applications for entry under the homestead, desert land, and other laws.

12. Furnished over 125,000 copies of certified documents, as against 4,100 in 1897, 18,000 in 1907, and 88,000 in 1917.

13. Approved for patent 32,120 homestead and kindred entries.

14. Acted upon 5,243 applications for second homestead entry under the act of September 5, 1914 (38 Stat., 712), as against 5,179 the year previous.

15. Secured the withdrawal for stock driveways under the grazing homestead act of 2,079,979 acres.

16. Patented 913 reclamation homestead entries, as against 824 the year previous.

17. Approved for patent 914 Minnesota drainage cash entries under the Volstead Act, covering an area of 146,240 acres. Patented under this act to date 590,600 acres.

18. Sold 1,450 town lots in town sites on Indian reservations and reclamation projects for $152,974.50.

19. Issued 3,952 Indian trust patents embracing 1,089,765.62 acres, as against 5,839 patents embracing 945,874.73 acres the year previous.

20. Issued 4,974 patents in fee to Indians embracing 726,969.81 acres, as against 2,014 such patents for 246,230.16 acres in 1917.

21. Patented 943,339.78 acres under railroad grants.

22. Classified in the field 1,600,000 acres of Oregon and California grant lands, revested in the United States by the act of June 9, 1916 (39 Stat., 218).

23. Opened to entry under the homestead law 450,000 acres of Oregon and California grant lands.

24. Sold the timber on 4,197 acres of Oregon and California grant lands, for which the sum of $145,888.28 was received.

25. Ascertained amount of taxes due and unpaid on the revested Oregon and California grant lands and paid thereon the sum of $1,529,957.57.

26. Approved for certification State selections aggregating 2,305,676.35 acres, as against 1,233,926 acres in 1917 and 1,145,167 acres in 1916.

27. Issued eight permits authorizing exploration of potash on public lands, under the act of October 2, 1917 (40 Stat., 297).

28. Awarded 12 leases of public lands for the production of potassium; 11 in the Searles Lake Basin, Cal., and 1 in Sweetwater County, Wyo.

29. Collected and deposited in the United States Treasury in connection with power permits $14,622.55, as against $8,407.33 in 1917 and $2,918.30 in 1916.

30. Restored to entry from Carey Act segregations 657,078.31 acres and patented under said act 11,643.96 acres.

31. Patented 2,093 desert-land entries embracing 340,281 acres, as against 1,752 in 1917 covering 277,432.33 acres.

32. Effected, by diligence in field work, a notable reduction of fraudulent efforts to secure public lands.

THE INDIAN OFFICE.

1. Cooperated actively with the War Department in the policy of mingling Indian soldiers with white organizations, as conducive to their military service and prospective citizenship. Conducted the registration of June 5, 1918, according to the plan of previous registrations approved by the Provost Marshal General. Reports 8,000 Indians in all branches of the Army and Navy; approximately

$15,000,000 of Indian subscriptions to the first three issues of liberty-loan bonds; 10,000 Red Cross memberships; 100,000 garments and other articles made and contributed; and 500 Christmas boxes, besides contributions of live stock, wool, and grain by Indians in Red Cross work. Promoted active campaigns for coordinating with the various Federal administrations in all agricultural activities, employment of labor, and the saving and consumption of foods at Indian schools and on the reservations.

2. Made a successful application of the "new declaration of policy" by releasing thousands of Indians from guardianship and pushing the work of competency commissions on 16 reservations besides the Five Civilized Tribes, and issued patents during 18 months on nearly as much acreage as was patented in the preceding 10 years.

3. Maintained, despite the loss of many employees for war service, a strong system of vocational education combining academic instruction with productive practice in home economics, farming, and the ordinary trades essential to good agriculture. Graduated about 100 students in full vocational courses and issued certificates of educational competency to most of them. Enrolled 18,669 children of the Five Civilized Tribes in the public schools of 2,292 districts, and in other jurisdictions placed 2,436 children in the State schools under tuition contracts. Increased public-school facilities for Indian pupils made it practicable to discontinue about 20 Indian day schools. Enrolled 30,000 Indian children in the State public schools.

4. Fully sustained regular health work in the operation of all sanitoria, successfully combating severe epidemics in some localities, notwithstanding the transfer of many physicians and nurses to war service.

5. Made substantial progress in irrigation. Expended $150,000 for enlargement and extension of canals on the Crow Reservation and brought 3,000 additional acres into irrigated cultivation on the Fort Hall Reservation. On the Uintah Reservation cultivated irrigable land was increased over 30 per cent. The Yakima Reservation shows increased returns with crops from 64,000 acres under ditch, having an average value of $100 per acre. Phenomenal yields of from $300 to $400 per acre have come from irrigable lands in the Salt River Valley, Ariz., and the development of an underground supply of stock water has made successful progress.

6. Continued the intensive food campaign of the previous year with a cultivation of 759,933 acres as compared with 676,691 acres in 1917, an average increase of 12.3 per cent, and practically every reservation showing an increase of from 5 to 100 per cent. Inaugurated a systematic program for the live-stock industry, covering such important features as water supply, fencing, winter protection and feeding, removal of worthless horses, and the proper disposition

of scrub stock. Enlarged experimentation work and established an experimental date farm on the Malki Reservation, Cal.

7. Began the formulation of definite aims and plans for attention to hitherto neglected tribes and remnants of tribes of Indians.

8. Sold at public auction in the Osage Reservation oil leases aggregating 90,286 acres of scattered tracts for a bonus consideration of $3,258,312, an average of $36 per acre, and carrying a royalty of one-sixth and one-fifth, depending upon the production per quarter section. The gross production of oil for the year was 10,906,376 barrels, of which the Osage Tribe received a royalty of 1,842,692 barrels. The total receipts to this tribe amounted to about $8,000,000. Will soon offer some 43,000 acres additional for oil leases, including 28,000 acres on the "west side," and about 315,000 acres for gas leases.

9. The oil lands of the Five Civilized Tribes produced during the year approximately 13,000,000 barrels from 116,000 acres, yielding a tribal revenue of about $4,000,000. The best return from other reservations has been from a well on the Kiowa Reservation, Okla., producing several hundred barrels per day.

10. A large number of allotments were made in the various reservations, including 1,385 acres to the Morongo Indians in California, 5,700 acres to the Fort Sill Apaches in Oklahoma, besides about 6,000 acres to Indians on the public domain. Under the noncompetent act 662 pieces of allotted land were sold, and 438 pieces under the inherited act, at an average of $22 per acre, which is the highest average price ever received for Indian lands.

11. Forestry activities gave special attention to the sale of timber and the production of material suitable for war industries. Substantial assistance was rendered in supplying walnut for gunstocks and airplane propellers, of spruce for airplane frames, and of construction material for governmental and industrial building.

12. The purchase of all supplies was in cooperation to the fullest possible extent with the Federal Food and Fuel Administrations and the War Industries Board.

13. The suppression of intoxicants received vigilant and active attention, especially in Oklahoma, where it became necessary to hold up quarterly payments of about $2,800,000 to the Osage Indians as a means of promoting a cleaning up of the liquor situation, and where the campaign was waged upon the specific declaration that "the bootlegger must go and bootlegging must cease before another dollar of Osage Indian money is released for expenditure in Osage County." A very vigorous handling of conditions was followed by marked and apparently permanent improvement. Public sentiment in Minnesota has become much more friendly to liquor prosecutions and suppression of the traffic has gained effective headway in a large area covered by the Chippewa treaty of 1855.

14. In the Five Civilized Tribes 101,506 Indians are enrolled, of whom 78,101 are citizens by blood, adoption, or intermarriage; 26,774 are full-blood citizens; and 23,405 are freedmen. Restrictions against alienation of allotted lands have been removed from all but about 18.3 per cent of the 15,794,208 acres allotted. Twenty-three thousand four hundred and forty-one Indians are still in the restricted class; that is, their allotments and funds are under Government supervision. There were sold during the year 3,558,165 acres of tribal lands for $20,249,032.58, being $4,505,563 more than the appraised value.

There were constructed during the year 127 houses, at a cost of $134,466.67; 51 barns, at $22,912.95; and 96 wells, at $8,093.94. There were purchased 472 horses and mules, at a cost of $63,739.78; 494 cattle, at $35,766.84; 509 hogs, at $13,088.66; and 228 wagons, at $35,092.15. Miscellaneous farm implements were purchased, at a total cost of $25,544.10. There was disbursed on account of per capita payments, improvements, and individual cash payments to Indians, salaries, and expenses a total of $12,455,146.08. There was received of individual and tribal funds and congressional appropriations a total of $16,175,520.73, showing a grand total of all moneys handled for the Five Civilized Tribes during the fiscal year of $28,630,666.81.

Four thousand Indians of the Five Civilized Tribes have entered the United States military service; $6,923,670 of the individual Indian funds of restricted Indians of the Five Civilized Tribes have been invested in liberty loan bonds and war saving stamps.

THE BUREAU OF PENSIONS.

1. Paid for pensions, $179,835,329.

2. Returned to the Treasury $3,241,471.90 of the amount appropriated by Congress for the payment of pensions.

3. Returned to the Treasury $141,053 of the sum appropriated for the maintenance and expense of the pension system, including salaries of special examiners.

4. Reduced the number of employees by 129 persons, including 87 transferred to other pay rolls in the department, without the necessity of dismissing any employee.

5. Under section 314 of the act of October 6, 1917, providing an increase of pension to $25 for certain widows of veterans of the Civil War, War with Spain, and Philippine insurrection, 284,608 widows' cases were adjudicated and increased rate allowed.

6. Under the act of June 10, 1918, amending the act of May 11, 1912, and providing increased rates of pension to Civil War survivors, 93,016 cases were adjudicated after the passage of the act and prior to July 1, 1918.

7. Convictions of violations of the pension laws were obtained in each of the 12 criminal cases tried during the year.

THE PATENT OFFICE.

The total number of applications for patent, including reissues and designs, received during 1917 was 71,620, and in 1918, 64,979, a decrease of 6,641 over the prior year. The total number of applications awaiting action on June 30, 1917, was 16,058, and the number awaiting action June 30, 1918, was 14,769, a decrease of 1,289. The total number of patents granted in 1917 was 44,179, and the total number in 1918 was 40,526, a decrease of 3,653.

The total receipts of the office were $2,103,660.56, and the total expenditures for all purposes were $2,131,616.18, a decrease on earnings over expenditures of $27,955.62.

THE BUREAU OF EDUCATION.

1. Prepared and installed addressograph mailing list of individual schoolhouses in the United States, comprising more than 200,000 addresses.

2. Printed and circulated 802,835 copies of printed bulletins, reports, and other documents, and approximately 3,560,000 copies of circulars and duplicated letters.

3. Conducted extensive correspondence on educational matters. In all, 162,479 letters were received at the bureau, an increase of almost 25,000 over the previous year and almost ten times as large as the number received in 1910.

4. Issued, in cooperation with the United States Food Administration, three series of leaflets, containing a total of 96 lessons on community and national life. More than 3,000,000 copies were sold by the superintendent of documents.

5. Made, at the request of State and local school authorities, 13 educational surveys, including Tennessee (administration, support, and normal schools); South Dakota (entire State system); Columbia, S. C.; Bradley Polytechnic Institute, Peoria, Ill.

6. Secured the construction of 2,523 game tables by public-school pupils for use in Army camps and cantonments and naval training stations.

7. Assisted the War Department in the selection of training schools for Negro drafted men.

8. Assisted the committee on education and special training of the War Department in formulating courses of instruction for enlisted men.

9. Continued efforts for maintaining school attendance during the war.

graphic engineers, and 10 other commissioned men, and had in service in France under commission on June 30, 1918, 70 engineers, 1 of whom has received the croix de guerre.

18. Conducted a training school for topographic engineers, in which instruction was given to men sent to Washington from engineering colleges elsewhere and to reserve engineer officers and men detailed for instruction in topographic field methods preparatory to service overseas.

19. Carried on special military topographic surveys along the borders of the United States in cooperation with the War Department and prepared and published maps based on surveys made in cooperation with that department.

20. Made special surveys of sites for munition plants, testing grounds, artillery ranges, aviation fields, cantonments, and other military establishments with respect to drainage, water supply, building and road material, oil and gas, etc.

21. Made special studies at camps and cantonments with a view to publishing maps and descriptions of the sites of the camps and the neighboring country that should emphasize the military uses of a knowledge of topography and geology, published two such maps and descriptions, and prepared four others for publication.

22. Compiled and printed maps showing the motor-truck routes available for the easy transportation of military supplies, maps showing airplane routes, and special charts and maps for use at instruction camps.

23. Continued work on a panoramic camera for aerial use in topographic mapping, especially military mapping, cooperated with Army engineers in making aerial photographs, and prepared for publication maps made by aerial photographic surveys.

24. Prepared for the War and Navy Departments reports in regard to the supply of ground water at about 50 localities, and prepared and submitted to departments and bureaus engaged in the conduct of the war many reports on water supplies.

25, Surveyed about 60,000 square miles of desert country in southern California and southwestern Arizona, examined practically all watering places in the region surveyed, taking samples of water, and erected 635 signs directing travelers to water. The maps made and the data obtained were made available to the Army engineers for incorporation in the progressive military map of the United States now in preparation.

26. Drilled exploratory wells in a desert area in Nevada, found potable water, surveyed the area, and obtained information for a full report on it.

27. Continued stream measurements in the Ohio River basin in cooperation with the Corps of Engineers, United States Army, with a view to flood control and improvements in navigation.

28. Continued, in cooperation with the United States Reclamation Service, measurements of streams that are to furnish water to reclamation projects under construction.

29. Continued studies of stream flow in the Los Angeles National Forest in cooperation with the Forest Service, in 18 Indian reservations in cooperation with the Office of Indian Affairs, and in the Yosemite, Glacier, and Yellowstone Parks in cooperation with the National Park Service.

30. Continued stream gauging at 1,182 stations in the United States, including Alaska and Hawaii, a large part of the work being done, as heretofore, in cooperation with 22 States and Hawaii, and published 13 reports on supplies of surface water.

31. Made ground-water investigations in 19 States, in the District of Columbia, and in Alaska, and published 3 reports on ground water.

32. Made analyses of 208 samples of water collected in different parts of the United States and interpreted for publication about 1,500 analyses made elsewhere.

33. Classified 9,972,256 acres of public land as coal land and recommended the withdrawal from entry of 9,369 acres of coal land and the restoration to entry of 1,105,622 acres.[1]

34. Recommended the withdrawal from entry of 171,247 acres of probable oil land and the restoration to entry of 117 acres, and classified 42,097 acres of Indian lands as oil lands.

35. Recommended the withdrawal from entry of 248,030 acres of probable phosphate land and the restoration to entry of 30,034 acres.

36. Classified 5,161,080 acres of public land as nonirrigable, thus concluding action on 8,020 petitions from intending entrymen.

37. Designated 7,538,962 acres of land under the stock-raising homestead act, disposing of nearly 15,000 out of 49,000 applications for stock-raising homesteads.

38. Recommended the withdrawal from entry of 137,505 acres of public land probably available for use as water-power sites and the restoration to entry of 2,230 acres previously so withdrawn.

39. Recommended the withdrawal from entry of 4,756 acres of land probably available as public water reserves and the restoration to entry of 1,830 acres of such lands previously withdrawn.

40. Cooperated with the General Land Office by reporting on 3,871 cases other than those involving enlarged homesteads and stock-raising homesteads, and acted on 1,390 reports on field examinations made by that office.

41. Devoted its lithographic plant in large part to work for bureaus and offices of the War and Navy Departments and of other Government departments and boards, printing for military use numerous maps, some of them covering areas on or near the firing line in France and Belgium, as well as charts, diagrams, recruiting posters, and other illustrations.

42. Published topographic maps of 299 areas in the United States in editions aggregating 703,338 copies and geologic maps of 5 areas in editions aggregating 494 copies.

43. Printed maps of more than 2,000 areas for other branches of the Interior Department.

44. In cooperation with the United States Coast and Geodetic Survey and the Army War College translated from the French and published for the use of the Geological Survey's topographic engineers and other American engineers in France a manual of military mapping and technical instruction designed for use in artillery work.

45. Published 163 separate scientific and economic reports, aggregating 14,227 pages, and 304 maps, and distributed 576,655 books and 530,706 maps.

46. Carried on general correspondence with the public, largely in reply to inquiries for technical information.

THE RECLAMATION SERVICE.

1. Continued the construction and operation of irrigation works capable of furnishing water to 2,000,000 acres of arid land, and actually irrigated over 1,000,000 acres, covered by project statistics, or approximately 30,000 farms, in 15 States, equivalent to the cultivated acreage of Vermont, New Jersey, or Florida at the census of 1910, and producing crops valued at nearly $60,000,000.

2. Increased the area irrigated by the service 50,000 acres over that irrigated the previous year.

3. Operated irrigation works including 40 reservoirs, several power and pumping plants, over 11,000 miles of canals, as well as drainage systems, pipe lines, flumes, and tunnels, and nearly 90,000 structures, such as dams, headgates, weirs, checks, drops, etc.

4. Continued the extension of the projects, including the construction of 460 miles of canals, 120 miles of drains, over 1,000 bridges and culverts, 7,800 canal structures, and excavated 9,000,000 cubic yards of earth and rock.

5. Standardized the numerous irrigation structures in the interest of economy and the efficient operation of the projects.

6. Turned over to the water users' association the operation of the Salt River project, in Arizona, in accordance with the general intent and spirit of the reclamation act.

7. Opened areas aggregating 10,000 acres to settlement on the Grand Valley and Uncompahgre Valley projects in Colorado.

8. Cooperated with other departments of the Government, with other bureaus of the Interior Department, with State governments, and with numerous local project organizations in the furtherance of reclamation work and the interests of the water users.

9. Prepared numerous press bulletins and gave numerous illustrated lectures before various societies and organizations explaining the activities of the service and the opportunities for settlers on Government irrigation projects.

10. Contributed 779 employees as commissioned officers or enlisted men to the armed forces of the United States.

THE BUREAU OF MINES.

Cooperated with the War Department and the Navy Department, the Department of Agriculture, the United States Fuel Administration, the National Research Council, the United States Shipping Board, the Capital Issues Committee, the Council of National Defense, the War Industries Board, the Bureau of Standards, and with other bureaus of the Interior Department in solving war problems that were of immediate importance.

1. Developed a great experiment station at the American University near Washington, D. C., for devising and testing toxic gases, also toxic and nontoxic smokes, and gas masks, flame throwers, incendiary bombs, and signal lights. Trained many men in the uses og gases and smokes and flaming liquids. At the end of the year the organization built up for these investigations was transferred to the War Department to become a part of the Chemical Warfare Service.

2. Organized a staff of chemical engineers, developing processes for the large-scale manufacture of toxic gases, which was later transferred to the Ordnance Department of the Army.

3. Aided the Government in obtaining the services of thousands of experts for special duties.

4. Investigated methods for the treatment of ores and minerals throughout the country to ascertain the available supply of those especially needed in the conduct of the war.

5. Organized a body of engineers and chemists as the war-minerals investigation to ascertain how necessary war materials, such as nitrates, manganese, chrome, magnesite, nickel, tin, and platinum, could be obtained most readily.

6. Cooperated with the War Department in the study of the production of artificial nitrates and in the development of processes and plants for their manufacture.

ALASKAN ENGINEERING COMMISSION.

Substantial progress has been made in the construction of the Alaska Railroad during the year. The rehabilitation of the Alaska Northern Railway from Seward, the Southern terminal, to Kern Creek, a distance of 71 miles, was continued, and it is expected will be completed during 1919. The grading along Turnagain Arm was completed and rail connection made between Seward and Anchorage, 114 miles, thus establishing through traffic between Seward and the Matanuska coal field. Work has been well started on the harbor improvements at Anchorage. The dredging work was commenced in April. A trestle to the dock site has been completed and rock has been hauled for riprapping along the trestle. Grading on the main line north of Montana Creek as far as the mouth of Indian River, a distance of 55 miles, is under way. Rail has been laid north of Anchorage as far as Talkeetna, 116 miles. A bridge is now in course of construction across the Talkeetna River. When it is completed track laying will be continued northward from that point.

The Tanana Valley Railroad, which was purchased by the Government last year, was kept in operation throughout the winter. Some work on repairing of bridges and trestles and ballasting of portions of the roadbed was done. On account of unusually high water during the breakup, the Nenana River changed the course of its main channel through what is known as Lost Slough. This necessitated changing about 20 miles of the main line as originally located and partly constructed. The survey for this new line was completed and grading and track laying is now in progress, rail having been laid 24 miles south from Nenana.

Five miles of track was laid south from Happy Station last year down Goldstream to a body of timber suitable for ties and firewood and several thousand cords of wood were made available for the mines and communities of the interior. Clearing has been completed between Nenana and Happy Station. Grading is under way between these points and track laying has been completed to 7 miles south from Happy Station.

The Alaskan Engineering Commission continued to operate the coal mines at Eska Creek and Chickaloon. The greatest amount of work was done at the Eska Creek mine, where there were employed throughout the year from 100 to 125 men and the production was from 100 to 200 tons of coal per day. The work at Chickaloon consisted principally of sinking on a 6-foot bed of coal and doing other development work preparatory to producing coal. Several hundred tons of coal were mined during the course of development. The Chickaloon mine produces a good blacksmith coal, and about 100 tons of it were shipped to Nenana in the summer of 1918 for use of the railroad.

These coal mines are operated by the Alaskan Engineering Commission primarily to furnish coal for the construction and operation of the railroad. A small amount of the coal was sold to the public in Anchorage and vicinity when the privately operated mines were unable to supply the market.

During the winter the Matanuska Coal Co., which has a lease on units 2 and 3 in the Matanuska coal field, mined approximately 3,000 tons of coal and hauled it to the railroad by sleigh. Some of this coal was sold by the company to the market in Anchorage and vicinity and proved to be satisfactory for domestic use as well as for steaming purposes. The Chickaloon Coal Co., which has leased units 10 and 11, started active development work in the fall of 1917 and continued work throughout the year. In August, 1917, a 6-foot bed of lignite coal was discovered near the right of way of the main line of the railroad on the Little Susitna River, 61 miles north of Anchorage. Private parties secured a free-use permit on a 10-acre tract, and coal was supplied to the local market. Coal was also discovered on the right of way of the railroad 28 miles south of Nenana. This is a lignite coal. It was used in one of the pile drivers of the commission and proved satisfactory. The bed from which this coal was taken is being developed under a free-use permit under the act of October 20, 1914. Several beds of coal were also discovered along the right of way on the west side of the Nenana River. At one place, 49 miles south of Nenana, five different beds ranging in thickness from 5 to 20 feet were found. Work is going forward on these beds by private parties with a view to developing a producing coal mine. It is expected that rail will be laid as far south as these prospects and coal supplied for the railroad and other industries of interior Alaska during the coming winter.

There was considerable activity in agricultural development during the year. In the Matanuska Valley there was an overproduction of turnips and potatoes during the season of 1917, and arrangements were made whereby turnips were shipped to Seattle, Wash., where they sold at from 1 to 1½ cents per pound higher than the local turnips. The steamship companies reduced their rates on potatoes so that they could be shipped to towns along the coast of Alaska in competition with the outside potato. This resulted in a market for several hundred tons which would otherwise have been wasted. On account of the overproduction of these root crops the farmers were urged to adopt diversified farming, and as a result more grain crops were put in this year. Some of the farmers are getting a start with cattle, hogs, and chickens. It has been demonstrated that in order for the farmers of Alaska to make a success of agriculture diversified farming must be adopted.

THE NATIONAL PARK SERVICE.

1. Continued the work of informing the public about the national parks and national monuments under the jurisdiction of this service.

2. Prepared and distributed nearly 150,000 circulars of information relating to these recreational areas.

3. Prepared and distributed approximately 100,000 automobile maps of the national parks.

4. Prepared the third edition of the National Parks Portfolio, soon to come from the press, and began preparation of second illustrated edition of Glimpses of Our National Parks.

5. Arranged for publication of Wild Animals of Glacier National Park, by Vernon Bailey and Mrs. Florence Merriam Bailey; The Volcanic History of Lassen Peak, by J. S. Diller; and Mountaineering in Rocky Mountain National Park, by Maj. Roger W. Toll.

6. Continued circulation of large quantities of motion-picture film and lantern slides of scenes in the national parks.

7. Engaged in close cooperative work with the new Bureau of Service, National Parks and Monuments, established in Chicago by the United States Railroad Administration to inform the public regarding railroad rates and tours to national parks, monuments, and other resorts.

8. Visitors to national parks during 1918 season, 454,841; 1917, 487,368; 1916, 358,006; 1915, 335,299; 1914, 240,193.

9. Automobile travel practically the same as last year. Licenses issued in 1918 season where motor permits are required reached a total of 23,778. In 1917, 23,525 licenses were issued, 15,536 in 1916, 12,609 in 1915, and 4,455 in 1914.

10. Casa Grande Ruin placed in grade of national monument, thus reducing number of reservations of national park class to 16.

11. Assumed jurisdiction of Katmai National Monument in Alaska, established September 24, 1918.

12. Assumed control of protection and improvement of Yellowstone National Park, heretofore under jurisdiction of War Department, and combined administration, protection, and improvement features of park government, thus establishing single direction and making possible much more economical and efficient operation.

13. Organized new ranger force to relieve troops on duty in Yellowstone Park.

14. Investigated status of lands embraced in proposed enlargement of Yellowstone National Park by addition of Teton Mountains, Jackson Lake, scenic region north of Buffalo Fork, of Snake River, and headwaters of the Yellowstone River.

15. Prepared 324.4 acres of land for cultivation of hay for animals and seeded 111 acres in Yellowstone National Park.

16. Completed first unit of cottages, water system, and other improvements on administrative site near western entrance to Glacier National Park.

17. Completed Logan Pass Trail, thus opening to public wonderful section of Glacier Park heretofore inaccessible.

18. Began survey and development of transmountain road project in Glacier Park for submission to Congress at end of war.

19. In cooperation with Bureau of Fisheries, built and equipped a fish hatchery near Glacier Park Hotel.

20. Completed extensive improvement of road in Mount Rainier National Park between park entrance and Paradise Valley.

21. Purchased telephone line between Ashford and Longmire Springs and extended same to Paradise Valley; also completed other improvements to telephone system.

22. Continued clearing and improvement of camp sites in Mount Rainier National Park.

23. Built scenic Skyline and Tatoosh Trails from Paradise Valley, thus opening new and attractive side trips for tourists in Mount Rainier Park.

24. In Crater Lake National Park made extensive camp-ground improvements, including purchase of pumping plant and other equipment for water systems, and preparation of same for installation.

25. Under War Department, road around the rim of Crater Lake completed.

26. Continued reconstruction of El Portal Road in Yosemite National Park; completed widening and grading of road system on floor of Yosemite Valley.

27. Completed new hydroelectric power plant on Merced River in Yosemite National Park; and, on September 7, 1918, dedicated same.

28. Rebuilt Ledge Trail, and completed new trail to Ten Lake Basin and new trail between Merced Lake and Tuolumne Meadows by way of Babcock and Emeric Lakes.

29. Leased tract of land in Yosemite Park to State of California for fish-hatchery site. New hatchery soon to be erected by the State and operated in cooperation with the National Park Service.

30. Began construction of new metallic telephone system between El Portal and Yosemite Valley.

31. Completed timber exchange under which part of the forest along Big Oak Flat Road is acquired by the Government, together with 7,000 acres of patented lands in the park area.

32. In Sequoia National Park discovered beautiful new cave of large proportions, and began improvement of same in the public interest.

33. Constructed in the Giant Forest the first unit of new administrative village, consisting of ranger quarters, storehouse, stable, and garage.

34. Consolidated concessions in General Grant National Park, thus providing higher-class service to visitors. These concessions are operated in connection with camps and trail transportation facilities in the region proposed as an addition to Sequoia National Park.

35. Opened beautiful Lake Nanita in Rocky Mountain National Park by construction of new trail.

36. Developed Glacier Basin, in Rocky Mountain Park, as camping grounds for automobilists.

37. Conducted the regular winter carnival at Fern Lake in Rocky Mountain National Park.

38. Comprehensive plans for improvement of Hot Springs Reservation submitted; and, under appropriation of $190,000, began arrangements for construction of new Government free bathhouse and administration building.

39. Finished and equipped museum building in Mesa Verde National Park; also placed relics and pictures therein for exhibition purposes.

40. Constructed new road to the top of Mesa Verde, thus eliminating dangerous section of highway around Point Lookout; also built shelter for automobiles and established automobile camp in Mesa Verde Park.

41. Installed electric-lighting system and improved the water system at Spruce Tree Camp in Mesa Verde Park.

42. Improved the highway to Devil's Tower National Monument in Wyoming.

43. Began the improvement of the Sitka National Monument in Alaska, which will include the strengthening and repainting of all of the great totem poles in this reservation.

44. Under the $10,000 appropriation, organized a ranger force to protect Sieur de Monts National Monument in Maine.

45. Planned and laid out a flying field in Sieur de Monts National Monument.

ABSTRACT OF REPORTS OF BUREAUS AND OTHER ADMINISTRATIVE UNITS OF THE DEPARTMENT.

OFFICE OF THE SOLICITOR.

The following table shows the number of matters received and disposed of during the fiscal year ended June 30, 1918, which were docketed or recorded. It does not, however, account for a very large number of miscellaneous matters of which no formal record was kept.

Work of office of solicitor.

	Public lands.		Pensions.		Miscellaneous.[1]	Disbarments.	Summary.
	Appeals.	On rehearing.	Appeals.	On rehearing.			
Pending July 1, 1917	489	113	188	1	107	6	904
Received to June 30, 1918	1,714	286	706	23	10,313	17	13,059
Total	2,203	399	894	24	10,420	23	13,963
Disposed of to June 30, 1918	1,724	310	613	16	10,319	17	12,999
Pending July 1, 1918	479	89	281	8	101	6	964

[1] Under "Miscellaneous" are grouped such matters as opinions, Indian matters, contracts, leases, etc., as well as many other varied matters arising in the several bureaus of the department, and which for one reason or another may be referred to the solicitor's office for consideration.

Originally the solicitor's office was charged with the adjudication of appeals from the General Land Office, motions for rehearing relating thereto, and the preparation of opinions on miscellaneous questions of law. Little by little the scope of the work has increased, however, until it now includes many appeals, contracts, leases, and varied miscellaneous matters from the Geological Survey, Reclamation Service, Bureau of Mines, Bureau of Education, Indian and Pension Offices. In addition to the above this office handles a great amount of correspondence between the department and individuals, also with the other executive departments, especially with the Department of Justice relative to litigation. In this class may also be mentioned the consideration and preparation of reports on proposed or pending bills in Congress. Notwithstanding the great number and variety of questions thus presented, it will be noted from the above table that of those formally docketed but 964 matters were pending and undetermined at the close of the fiscal year. Those remaining, having relation to public land and miscellaneous matters, were less than for a number of years, while the pending pension cases were but slightly greater than last year. However, all are now reached within approximately 60 days from docket and are disposed of with such dispatch as careful examination of the records and consideration of the questions involved will warrant.

The volume of court work during this year was a little less than that of the preceding year; but the result was uniform success, no case having been determined adversely to the department in any respect. Seven cases were disposed of in the Supreme Court of the United States; 5 in the Court of Appeals (one appeal being dismissed); and 13 in the Supreme Court of the District. In addition, three interlocutory matters were argued and decided in favor of the Secretary. In the court of appeals judgment on mandate reversing a former decision of that court against the department was taken, and likewise in the Supreme Court of the District judgment on mandate in two cases was obtained. Five cases have been argued and submitted but are yet undecided by the courts. Eleven new suits were filed. There are now 45 suits pending, 7 in the United States Supreme Court, 3 in the Court of Appeals, and 35 in the Supreme Court of the District.

GENERAL LAND OFFICE.

Area of land entered and patented.—The total area of public and Indian lands originally entered and allowed during the fiscal year ended June 30, 1918, is 9,974,331.61 acres, not including 172,446.46 acres embraced in finals not heretofore counted as original dispositions of land. This latter area is constituted as follows: Public auction, 144,595.70 acres; abandoned military reservations, 1,131.91 acres; cash and private sales, individual claimants, and small holding claims, 5,964.28 acres; preemption entries, 40 acres; and soldiers' additional homesteads, 20,714.57 acres. The area of 9,974,331.61 acres is a decrease of 6,227,462.77 acres, as compared with the area originally entered and allowed during the fiscal year 1917. This heavy decrease in allowed entries is due largely to the fact that the bulk of applications under the grazing homestead act have remained suspended pending designation of the land.

The area patented during the fiscal year is 9,552,482.217 acres, a decrease of 1,760,880.023 acres, as compared with the fiscal year 1917. Of the above area 6,492,797.816 acres were patented under the homestead laws, a decrease of 1,051,257.454 acres; not including as homesteads 20,906.54 acres patented as soldiers' additional entries.

Cash receipts and expenditures.—The total cash receipts from the sales of public lands, including fees and commissions ($1,160,350.88), sales of reclamation town sites ($48,687.41), and sales of lands in the Oregon and California railroad grant ($161,169.77), for the fiscal year 1918 were $3,420,783.64. The total receipts from the sales of Indian lands were $1,935,773.73. Other receipts aggregated $75,270.29. The total receipts of this bureau during the fiscal year 1918 were $5,431,827.66.

The total expenses of district land offices for salaries and commissions of registers and receivers and incidental expenses during the fiscal year ended June 30, 1918, were $821,758.15. The aggregate expenditures and estimated liabilities of the public-land service, including expenses of district land offices and surveys made from the appropriations for surveying the public lands outside of railroad land-grant limits, were $2,948,360.92, leaving a net surplus of $2,483,466.74 of receipts over expenditures. Disbursements from the following special deposit trust funds and reimbursable appropriations are not included in the above figures as receipts or expenditures; from deposits by individuals for surveying the public lands, $62,249.09; from surveying within land grants (reimbursable), $19,593.12; from opening Indian reservations (reimbursable), $10,167.37; and from surveying and allotting Indian reservations (reimbursable), $74,035.96.

Field service.—The total amount of cash collected and turned in to the Treasury as a result of the work of the field service during the fiscal year was $118,916.01; in addition there was turned in to the Treasury $8,900.46 as royalty for coal mined during the past year from a tract in Colorado.

As a result of investigations in the field 99,038 acres have been restored to the public domain. Of this amount 93,920 acres represent fraudulent entries canceled through proceedings based upon special agents' reports; 5,118 acres were restored to open range by abatement of unlawful inclosures without suit.

During the year 160 civil suits were tried in court, of which 93 were won and 67 lost; as a result of these suits, $55,720.16 were recovered and 157,874.95 acres were restored to the public domain.

Of the criminal cases tried during the year 32 resulted in convictions under which there were 10 prison sentences imposed and fines amounting to $6,426 paid.

As the result of constant vigilance on the part of the field service a notable decrease in fraudulent entries has been effected.

Wyoming.—In this State additional oil withdrawals aggregating 160,835 acres were made during the fiscal year and 117 acres restored as nonoil. On June 30, 1918, 1,053,900 acres were embraced within existing withdrawals; at the end of the fiscal year 61 applications for patent, embracing approximately 9,500 acres, were pending.

Oil contracts.—Contracts are pending entered into under the act of August 25, 1914 (38 Stat., 708), by oil-land claimants under which escrow deposits were received to the amount of $3,491,544.90.

Public surveys.—The area of accepted surveys and resurveys during the past year exceeds 11,000,000 acres, which is 1,000,000 more than the area accepted during the previous year, and is the third largest output for the last six years.

To meet the growing demand for resurveys in cases where the title to the greater portion of the land is vested in private ownership, special legislation is recommended.

The progress made in the execution of public-land surveys in Alaska during the past year is reported as satisfactory. In the Tanana Valley the group of public-land surveys initiated in the early summer of 1917 were extended southerly over agricultural areas in the Nenana Valley, and along the line of the Government Railroad, and connected with the surveys of the Nenana coal fields executed in 1915.

Surveys under this group were also further extended in the vicinity of the town of Nenana northerly and easterly, up Gold Stream, with the ultimate view of sectionizing the Gold Stream Valley adjacent to the Government line of railroad. Surveys were also extended from the latter group easterly up the Tanana Valley along the north bank of the river.

Surveys in the Susitna River Valley were also extended by a double party during the 1917 field season from the limits of the surveys of last year up the valley east of the river to the foothills and northerly along the line of the Government railroad within 10 miles of Talkeetna.

The surveys of town sites, Indian allotments, and others of a special character in Alaska are also reported.

Offices of surveyors general.—An improvement in the condition of the work in the offices of surveyors general is noted by the commissioner, due to the induction of improved methods. A monthly work report is now made, and a cost-keeping system which had previously been promulgated is operative and uniform. As a result the office cost on public-land surveys shows a decrease of 61 cents per mile, with a similar reduction in the office cost of handling mineral surveys.

Alaska shore spaces.—The commissioner calls attention to legislation now pending relative to reserved shore spaces between entries on navigable waters in Alaska, and submits a full statement as to reasons why the present law should be repealed.

Alaska coal lands.—In the Nenana coal field 25 leasing blocks have been created and offered for leasing,

In the Bering River field a lease containing 2,420 acres has been secured. The minimum investment to be made was fixed at $250,000, and work on the land has already been begun and early mining operations are expected.

In the Matanuska field operations have been conducted during the year by the lessees of blocks Nos. 2 and 3, and by the Alaskan Engineering Commission on the reserved lands in block No. 7, and in development of block No. 12, also reserved. The lessee of blocks Nos. 10 and 11 is now engaged in opening a mine and installing mining machinery upon the land for immediate operations.

Certified copies.—The growth of this work is notable. In 1897 the office furnished 4,100 pages of certified copies; in 1907, 18,000; in 1917, over 88,000; and in the year just closed, 125,000.

Homesteads and kindred entries.—The number of entries of all kinds approved for patenting is 32,120; of this number, 29,095 are homesteads, divided as follows: 2,303 commuted, 25,500 under the three and five year homestead law, and 1,292 under the forest homestead act of June 11, 1906. The remainder of the entries, 3,025, being timber and stone, isolated tract sales, and other cash entries.

Under the second homestead law of September 5, 1914 (38 Stat., 712), 5,243 applications received attention. Of this number 3,408 were accepted, the remainder being either disposed of by denial or by calling for additional evidence.

Stock-raising homesteads.—Notable progress under the law authorizing entries of this character is reported, some 7,500,000 acres having been designated as within the descriptive terms of the act and subject to entry thereunder. Up to the end of the fiscal year 734 entries have been allowed, embracing an acreage of 236,578 acres.

Stock driveways.—During the present year field investigations of all applications for driveways in Montana and South Dakota have been completed and disposed of, and the same is true of the work in Colorado, Oregon, Washington, and Wyoming, with the exception of pending investigations of recent applications or of areas heretofore temporarily withdrawn pending further investigation. The greater portion of stock driveway applications in California and New Mexico have been acted upon, and stock driveways established in Arizona, Idaho, Nevada, and Utah, and field investigation is progressing on the remaining recommendations and applications in those States.

Based upon field investigation and the recommendation of the commissioner, there have been withdrawn for stock driveway purposes in all 2,079,979 acres during the fiscal year.

Reclamation.—The commissioner reports the work on reclamation homesteads up-to-date in his office.

One large restoration known as the Teton unit of the Sun River project in Montana was made, aggregating about 40,000 acres. So great was the competition for these lands that approximately 5,000 applications therefor were filed.

Seven hundred and seventy-four final homestead proofs were received during the year and 945 disposed of, as against 828 the year previous. Of those disposed of, 913 were patented in 1918, as against 824 in 1917.

Forest lieu selections.—Recent decisions of the court and of the department affecting the adjustment of lieu selections under the act of June 4, 1897 (30 Stat., 36), are cited by the commissioner, the result of which will operate to expedite the disposition of these cases. The contested cases under this act practically all involved charges by the Government of invalid base arising out of the so-called Hyde-Benson conspiracy. In 61 of these cases decisions were rendered, 17 of which were favorable to the selectors and 44 adverse; most of the latter were appealed to the department. During the past year 96 selections under said act have been approved for patenting.

Lieu selections for lands in Indian reservations.—About 1,400 acres have been selected and patented under the act of April 21, 1904 (33 Stat., 211), which authorizes selections of public lands in New Mexico and Arizona in lieu of lands in Indian reservations. Two cases are still pending under this act, one relating to lands in the Navajo Indian Reservation in New Mexico, which the Santa Fe Pacific Railroad Co. proposes to exchange for other lands, involving 200,000 or 300,000 acres; the other proposed exchange is in the Pueblo Laguna Indian Reservation, involving about 47,000 acres. Negotiations are still pending under each of these cases.

Chippewa logging—Minnesota.—Logging operations under the act of June 27, 1902 (32 Stat., 400), during the past year have been comparatively small, due to the scarcity of labor as well as to the fact that most of the timber has been cut. During the past year there were cut 11,788,200 feet of timber, valued at $85,821.77. The total amount cut to date under said act has been 1,280,744,846 feet of timber, for which the purchasers have paid $9,069,478.99.

Minnesota drainage act.—During the past year there have been approved for patenting 914 drainage cash entries under the Volstead Act, embracing approximately 146,240 acres. A total area of 590,600 acres has been patented under the Volstead Act.

Public sales of Indian lands.—The undisposed of lands in the ceded portion of the Crow Indian Reservation, Mont., aggregating 84,500 acres, were offered at public sale September 4, 1917, coal lands to be sold with a reservation of the coal deposits to the United States. The minimum price received was $2 per acre and the maximum $20; the average price, $4 per acre. The lands were listed by half sections and provision was made for payment of the purchase money in installments. All the land offered was sold.

In the former Siletz Indian Reservation, Oreg., two sections of timber lands were sold for $61,169.03.

Public sales of Flathead lands were held in August, 1917. In the Missoula land district 6,694.26 acres were sold for $13,387.76. In the Kalispell district 3,611.91 acres were sold for $7,548.62.

The remaining lands in the Cœur d'Alene Reservation, Idaho, were offered at public sale in August, 1917, and 1,326 acres sold for $1,694.97.

Opening of Indian lands.—Two openings of Flathead Indian lands are reported for the past year: The first, of 2,693.66 acres of nontimbered land, appraised at $7,150.72, and 4,983.58 acres of timbered lands, appraised at $25,706 for the land and $38,697 additional for the timber; the second opening of 4,754.56 acres of timbered land, appraised at $20,989.15 for the land and $41,552.50 for the timber. Owing to the high prices placed on the land and timber, the number of applicants for these lands was not large.

Under the President's proclamation of March 14, 1918, 88,685.09 acres of land within the former Fort Peck Indian Reservation, Mont., which had been classified and appraised without regard to the coal deposits therein, were open to entry with reservation to the Government of the coal deposits.

Indian allotments.—During the past year 3,952 Indian trust patents have been issued, embracing 1,089,762.62 acres, as against 5,839 trust patents, embracing 945,874.73 acres, the year previous.

A decided increase in the number of fee patents is noted, 4,974 as against 2,014 the year previous.

Railroad grants.—Patents were issued for 943,339.78 acres. One grant, that of the Corvallis & Yaquina Bay Wagon Road Co. in Oregon, was finally adjusted; four other grants are practically adjusted and only waiting minor action.

Oregon and California railroad lands.—Active administrative action under the act of revestment, June 9, 1916 (39 Stat., 218), is reported.

Up to the end of the fiscal year reports have been received in the General Land Office showing classification in the field of over 1,600,000 acres as timber lands or agricultural lands, these figures not including a large area of field work not yet reported. The lands classified as power site by the Geological Survey, in charge of this branch of the work, approximate 112,000 acres.

In pursuance of the policy announced by the department, approximately 450,000 acres of the revested lands were opened to homestead entry during the season of 1918, in aid of which a circular of information was printed in which was indicated by tabular statement a description of the land by 40-acre subdivisions, its topography, general character, presence of water, amount of timber thereon, nearness to towns, wagon roads, and railroads, together with a map showing the tracts open to entry by which the settler would be enabled to locate the lands he desired.

Sales of timber on lands classified as timberlands under section 4 of the act of revestment have been made, covering an area of 4,197.89 acres, for which the sum of $145,888.28 has been received.

The payment of taxes on the revested lands, as directed by section 9 of the act of revestment, has been brought well along to a conclusion, Treasury warrants issuing October 2, 1917, for the sum of $1,504,841.60 in payment of the taxes accrued and unpaid on the surveyed, patented lands unsold July 1, 1913, and by letter of July 31, 1918, the Secretary of the Treasury was requested to issue Treasury warrants for $25,105.97 in payment of the taxes on patented lands embraced within contracts of sale by the company, canceled, or in default July 1, 1913.

The proper administration of the act requiring the final adjustment of the grant in all particulars, among other things, calls for a survey of approximately 182,000 acres in the primary limits and indemnity limits outside of forest reserves not surveyed at the passage of the act; of these lands, 102,000 acres have been surveyed up to the present time.

The examination in the field of odd-numbered sections, apparently subject to the grant, to ascertain their mineral or nonmineral character is also necessary, and from the examination thus far made it appears that approximately 55,800 acres are found to be mineral, and the company has been served with notice of proceedings alleging the mineral character of such lands and their consequent exclusion from the grant, while 197,000 acres have been clear listed as nonmineral.

State selections and State grants.—Selections aggregating 2,305,676.35 acres received departmental approval during the past year.

State selections with reservation of coal to the United States were approved under the act of March 3, 1909, for 4,727.78 acres, and 82,518.69 acres of selections with like reservation under the act of June 22, 1910; 3,985.33 acres with reservation of oil and gas, and 97,725.56 acres with reservation of phosphate, under the act of July 17, 1914.

Pursuant to cooperative agreements entered into between some of the States and the United States, under which school lands within the boundaries of national forests are exchanged for other lands within national forest boundaries, 183,329.60 acres have been certified, and holdings of the United States and of the States consolidated to that extent.

Adjustment of the school grant.—The commissioner calls especial attention to the recent decision of the Supreme Court in the case of the United States *v.* Sweet (38 S. C. Rep., 193), holding that the grant of school lands to the State of Utah, while not expressly including or excluding mineral lands, in fact, does not pass title to lands of known mineral character at the time when the grant becomes effective, and points out the necessity of legislation by which purchasers from the State, in good faith, of lands subsequently ascertained to be mineral may perfect their title.

Swamp and overflowed lands.—Former recommendations of the commissioner for a legislative declaration that after a date fixed no new claims to swamp and overflowed lands be received or recognized by the Land Department are renewed.

National forests.—There are now 151 national forests, embracing 175,951,266 acres, of which area approximately 88 per cent is public land. The net decrease in national forest area since the beginning of the fiscal year is 300,894 acres. During the fiscal year 1,027,418 acres were excluded from national forests, but 77,033 acres thereof were withdrawn for certain public purposes, and the public lands subject to disposition in the remaining 950,385 acres, and in 13,101 acres released from temporary forest withdrawal were restored to entry and other disposition.

Potash lands.—Under the act of October 2, 1917 (40 Stat., 297), authorizing exploration for and disposition of potassium, general regulations have been promulgated, under which a total of 326 applications for permits to prospect for potash have been filed and 12 applications to lease have been received, 11 having been filed in the Independence office for lands in the Searles Lake Basin, Cal., and 1 in the Evanston office for lands in Sweetwater County, Wyo.

Rights of way.—In the year just ended, applications for rights of way of all kinds (excepting hydroelectric power) total 905, as against 624 in 1917. Of these, 101 were applications for railroad rights of way, as against 96 last year, and 804 other than railroad and power, as against 528 in 1917.

Attention is directed by the commissioner to the fact that the records of his office disclose the existence of many rights of way that have been granted, not followed by construction, and that such rights of way, in the absence of a law declaring forfeiture for failure to construct, prevent the allowance of later applications for lands covered by these unused easements, and therefore recommends a statutory declaration of forfeiture in such cases, with a proviso investing the Secretary of the Interior with authority to stay the forfeiture for a limited period, and that no easement shall become vested until proof of construction has been filed with and approved by the Secretary of the Interior.

Private irrigation projects.—During the past year 66 new reports and 24 supplemental reports have been received as a result of investigation of private irrigation enterprises and irrigation districts upon which desert land applications or entries depend for their water, making a total of 917 projects or districts reported on since the adoption of the regulations of September 30, 1910.

Hydroelectric power development.—During the year ending June 30, 1916, permittees paid into the Treasury of the United States $2,918.30; in 1917, $8,407.33; and last year, $14,622.55. These figures indicate a gradual increase in the power-site business, but it doubtless would have been very much greater had it not been for the pendency of the water-power bill in Congress, causing prospective applicants to await final action thereon.

Carey Act.—Areas aggregating 657,078.31 acres were restored to entry and 11,643.96 acres were patented.

Desert lands.—Two thousand and ninety-three final desert entries were patented, involving 340,281 acres, as against 1,752 entries in 1917, involving 277,432.33 acres.

Repayments.—Under the existing laws governing repayments there were stated during the last fiscal year 1,241 accounts, allowing repayment of $99,370.04. This number of claims allowed and the amount repaid includes 67 accounts, allowing repayment of $27,748.65 received in connection with sale of various Indian reservation lands and repaid from Indian trust funds.

INDIAN AFFAIRS.

Indian war activities.—The enrollment of Indian soldiers with white organizations has been upheld as affording them, under the usual Army discipline, associational contact and educational advantages favorable to their preparation for citizenship. The spirit of patriotism has been universally and aggressively emphasized.

The registration of June 5 was successfully conducted in cooperation with State authorities and clarified by issuing general rules for determining citizenship in doubtful cases. Indian accessions to the Army and Navy reached the approximate total of 8,000, with 6,500 in the Army, 1,000 in the Navy, and 500 in other military work.

Indian subscriptions for liberty bonds of the second issue were $4,392,750 and the third issue $4,362,300, which, inclusive of those reported last year, reaches a total of nearly $15,000,000, or approximately $50 per capita for all Indians in the United States.

Red Cross work developed into widespread activities, showing 10,000 memberships, 100,000 garments and other articles, 500 Christmas boxes, etc. Indians without money contributed steers, fleeces of wool, and sacks of grain.

Indian Service superintendents designated to act as Four Minute Men in the campaign for the sale of war savings stamps accomplished splendid results. Special efforts to give a war-winning purpose to all agriculture brought gratifying returns and in many instances doubled the product of the preceding year.

The number of unemployed and intermittent workers was greatly reduced among adults and grown students at the schools.

The efforts of the Federal Food Administration were urgently supported. The schools adopted the use of substitutes as far as possible consistently with purchases already made, and the Indians generally adjusted their living to war demands.

The recent administrative policy of good will and protection of the Indian's personal rights and material interests have borne fruit in an active and ardent patriotism which recognizes the close community of welfare for both Indians and whites.

New declaration of policy.—As practically applied, has released thousands of Indians and has been fully justified. The acreage patented in the 18 months of its operation nearly equals the area patented during the preceding 10 years. Competency commissions visited during the year 16 reservations besides the Five Civilized Tribes.

Indian education.—The system of Indian education makes use of the tendencies acquired by the Indian in his primitive state and keeps prominent the training that enables him to get a living but enlarges upon the individualistic aim by introducing features of culture and refining arts. The faculty of accurate observation and training of the senses to an acquisition of skill in doing is emphasized. The central idea of the course of study is the elimination of needless studies and the employment of a natural system of instruction built out of actual activities in industry, esthetics, civics, and community interests. Indian boys and girls are taught to design and make useful and beautiful things with their hands, and to aim at practical attainments in an artistic fashion throughout all the essentials of home making, and farming with its allied trades. It is thus possible to have daily three or four hours of productive work by pupils of sufficient age on the school farms and in the shops and the housekeeping activities. For the larger schools vocational courses of four years in home economics, agriculture, and mechanic arts are conducted, not for technical and highly skilled results, but for practical proficiency that will serve as an excellent basis for further advancement in special lines. The main purpose is to give to Indian pupils academic and vocational training that will function properly in their lives after they return to their homes or take up work away from the reservations in competition with whites.

Of the $275,000 appropriated for placing children of the Five Civilized Tribes in the public schools, $261,614 was expended in 2,292 districts for the benefit of 18,669 children. Out of 25,612 within the territory, 21,608 were in schools of some kind. Outside of the

Five Civilized Tribes, 2,436 children were placed in school in 186 public school districts under tuition contracts at a daily rate determined by the per capita cost of the school. About 20 day schools were abolished during the year because public school facilities were available. About 100 successful full-course graduates were reported at the close of the school year, most of whom were given certificates of educational competency. Special care is exercised in issuing these certificates as they are recognized as a warrant for issuing a patent in fee in the absence of later adverse developments.

The Indian school at Carlisle has been turned over to the War Department to be used for hospital purposes and for the reeducation and rehabilitation of sick and wounded soldiers. Accommodations for all Carlisle students are available in other Indian schools located nearer their homes, and no educational neglect will result. This school plant was formerly an Army barracks and under statutory provisions was returnable to the War Department whenever the property should be needed for military purposes.

Health and employment.—Health work during the year felt the loss of many physicians and nurses needed for war service overseas, but all the sanatoria have been operated, with some additional facilities provided, and the fight against tuberculosis and trachoma has been unabated. In a number of instances epidemics and contagious diseases called for unusual efforts, but no serious results followed. The campaign for better babies is now a regular feature of reservation activities. All interests are held as secondary to health. Employment of Indian students has greatly increased. Their call to high-class motor factories is insistent. More than 300 have been so employed and have had excellent supervision and opportunities for advancement. Young women in large numbers have entered clerical positions and fitted themselves for nursing in war hospitals. The southwestern schools supplied more than 100 farmers with student labor besides sending an unusually large force to the beet-sugar fields of the Arkansas Valley.

Irrigation.—To accommodate the rapidly increasing demand for water, an additional pumping plant was installed on the Colorado River Reservation. On the Fort Hall Reservation 3,000 additional acres of irrigated land were cultivated, making some 12,000 acres in all, on which crops aggregating in excess of $500,000 were raised. The development of underground water for stock in the Navajo country was continued with gratifying success, enabling the Indians to keep larger herds. On the Uintah Reservation there was an increase in the cultivated irrigable land of over 30 per cent. Exceptional returns continue to be derived from the Wapato project on the Yakima Reservation, where the crops from 64,000 acres under cultivation have averaged in value over $100 per acre; the work of bringing all of the land within this project under water is progressing rapidly. Phenomenal yields, aggregating in value from $300 to $400 per acre, have been returned by the irrigable lands in the Salt River Valley, Ariz.; every practicable means is being adopted to provide water for additional acreage in this valley. The keynote of the Indian Bureau's irrigation program is that there is no defense or excuse for the failure of man to bring together, for beneficent ends, immeasurable land and water waste, both for agricultural and stock-raising purposes.

Farming and stock raising.—The intensive food campaign inaugurated among the Indians in 1917 was continued during the year with increasingly successful results, reports indicating that 759,933 acres were cultivated by them in 1918, as compared with 676,691 acres during the previous year. Practically every reservation showed an increase, ranging from 5 per cent to 100 per cent. Hundreds of Indians are cultivating their land who never farmed before, but who have enthusiastically caught the spirit of the campaign for increased production, and many others have enlarged their cultivated acreage. Food conservation work among the Indian women and girls was also further developed during the year, and the noteworthy success of the Indians in winning prizes at county and State fairs in open competition has encouraged them to greater activity along agricultural lines, besides demonstrating to the whites that they are now a substantial factor in the industrial life of the country. Strong emphasis was laid upon the live-stock feature of increased production by giving special attention to all the details of this important industry, with the view of systematizing it on the Indian reservations, in conformity with the best practice of successful white stockmen, such as water supply, fencing, winter protection and feeding, the removal of worthless horses and predatory animals, the proper disposition of scrub stock, the care and handling of bulls, etc. Experimentation work with new varieties of crops has been continued, and an experimental date farm was established at Palm Springs, on the Malki Reservation, Cal., which promises to be entirely successful.

Reimbursable funds.—The use of reimbursable funds has materially contributed to the increased agricultural and live-stock activity of the Indians by providing the necessary funds to assist those without means, and repayments have been made in a very gratifying manner, in many cases before they were due. This plan enables worthy Indians to receive aid, and the necessity of repayment urges them to greater effort than would a straight gratuity.

Neglected Indians.—Special attention has been given during the year to several hitherto neglected tribes of Indians with the view of extending to them moderate aid in order that they, like the other

Indians, may have the opportunity to achieve self-support and citizenship.

Miscellaneous activities.—The activity of the Indians in native industries has been curtailed during the year owing to the diversion of their efforts to agricultural and other pursuits necessary to the successful prosecution of the war, and also by reason of difficulty in obtaining supplies therefor under war-time conditions.

The work of improving the roads and bridges on the Indian reservations has continued during the year, although to a somewhat less extent than formerly, in keeping with the policy of restricting construction activities to absolute essentials during the period of the war.

Under the declaration of policy announced last year greater liberality has been shown in giving competent Indians control of their individual funds; in the withdrawal of pro rata shares of tribal funds from the Treasury; and in the unrestricted use of annuities and per capita payments, on the whole, with encouraging results.

Allotments.—In addition to allotments continued on the Gila River Reservation, Ariz., the Umatilla Reservation, Oreg., and on the Fort Peck Reservation, Mont., 277 allotments, comprising an area of about 1,385 acres, were made to the Morongo Indians in California; 51 allotments, covering approximately 6,000 acres, were made to Indians on the public domain; 71 allotments, embracing about 5,700 acres, were made to Fort Sill Apache Indians, Oklahoma, and a large number of reallotments were made on various reservations covering lands better adapted for allotment purposes.

White Earth litigation.—A plan for the settlement of litigated allotment cases has been agreed upon, and this work is progressing in a highly satisfactory manner. These cases are the outgrowth of the act of June 21, 1906 (34 Stat. L., 353), removing restrictions as to adult mixed bloods. The work of determining just who are mixed bloods is being conducted by a commission under the act of June 30, 1913 (38 Stat. L., 88), and upon completion of the so-called "blood" roll a basis will be obtained for proper disposition of all pending cases.

Sale of lands.—Six hundred and sixty-two pieces of allotted land, covering 74,126.24 acres, were sold for $1,541,177.95 under the provisions of the noncompetent act; 438 pieces, covering 49,216.19 acres, were sold for $1,174,854.97 under the inherited act. The average price received from both allotted and inherited Indian land is $22 per acre. This is the largest average price that has ever been received from the sale of Indian land.

Forestry.—A revision of the general forestry regulations of the Indian Service was approved on February 5, 1918. Comparatively few changes were made from the regulations as first promulgated under date of June 29, 1911. The work of appraising timber and gathering data for accurate maps of timber areas was largely suspended at the close of the calendar year 1917 because of war conditions. Special attention was given throughout the year to the effecting of sales of timber and the production of material that would contribute to a satisfaction of the needs of the Nation in the line of war industries. Substantial assistance has been rendered in the production of walnut for gunstocks and airplane propellers, of spruce for air-plane frames, and of construction materials for governmental and industrial buildings.

Bookkeeping and accounting.—The "fund-accounting" feature of the new system of bookkeeping is being followed by disbursing officers generally with good results. To aid in the installation and operation of this new system, three expert accountants were selected from the field force and appointed as traveling auditors, which has proven to be an effective plan.

Supplies.—In the purchase of supplies there has been close cooperation with the Federal Food and Fuel Administrations, their State officers, and with the War Industries Board, and other organizations aiming at the regulation, production, and use of materials and supplies. The rule requiring the use of flour substitutes has been strictly enforced. Woolen uniforms have been dispensed with for the time being, and curtailment made in other lines. Little or no trouble was experienced in the delivery of an adequate coal supply. To aid in the conservation of coal, wood is being used more than heretofore.

Suppression of intoxicants.—The fiscal year just closed has been a very active one. As in previous years, the bootleggers have been the ever present, persistent, and malicious enemy of the Indian, and while improved, Federal and State legislation is helping to gain better control of the liquor traffic, it is apparent that continuous and uncompromising vigilence will be necessary to protect the red man and his property from the nefarious practices of these pests who respect no law or right and use any method or means to accomplish their destructive purposes.

In Minnesota public sentiment is yielding to the beneficial influences resulting from the measures taken to suppress the liquor traffic in a large portion of the State covered by the Chippewa treaty of 1855.

In Oklahoma the liquor conditions had again become so bad that quarterly payments to the Osage Indians (amounting that quarter to about $2,800,000) were held up pending a cleaning up of the liquor situation by the citizens of Osage County. This action brought cooperation and results.

On the whole the liquor situation is improving, and will continue to improve under the relentless vigilence which manifestly is necessary.

Indian heirship.—The probating of the estates of deceased Indians during the year progressed satisfactorily, and 2,415 cases were finally disposed of. One hundred and fifty-five Indian wills received final action, and 22 wills were disapproved. Twelve examiners of inheritance conducted hearings on 28 of the reservations and on the public domain; 3,745 miscellaneous cases were disposed of, and 7,586 letters written.

Probate work in Oklahoma, where there are nearly 37,000 restricted Indians, of which about 27,000 are full blood, is necessarily voluminous, especially as this jurisdiction comprises 40 counties, rich in deposits of oil and gas, lead and zinc, and other minerals, besides vast agricultural products, producing complicated conditions. This work has been successfully handled by probate attorneys, to whose number a woman appointee was added during the year with results in every way satisfactory.

Humanitarian aid.—The year has been one of closer affiliation in purpose and methods among all agencies, individual and organized, for the spiritual and moral betterment of the Indians, and has developed a broad fraternity of effort irrespective of denominational preference. The great instrumentalities for war relief have also made their invaluable service felt in connection with the work of the bureau.

Oil and gas interests.—Oil leases in the Osage Reservation aggregating 90,286 acres have been sold at public auction during the past fiscal year for a total bonus consideration of $3,258,312, or an average of about $36 per acre. These lands consisted of scattered tracts on the east side of the reservation selected with the object in view of opening up new pools of oil. The mineral rights belong to the tribe and leases are made for a period of five years and as long thereafter as oil is found in paying quantities or during the time in which the minerals are reserved for the benefit of the tribe, which will expire in 1931 unless otherwise provided for by Congress. The royalty is one-sixth and one-fifth, depending upon the amount of production from each quarter section. The gross production of oil during the past fiscal year amounted to 10,906,376 barrels, of which the Osage Tribe received a royalty of 1,842,692 barrels. The total receipts to the tribe amounted to approximately $8,000,000.

The production in the Five Civilized Tribes in Oklahoma during the fiscal year ended June 30, 1918, amounted to approximately 13,000,000 barrels of oil from 116,000 acres. The revenue of the tribe from oil and gas amounted to about $4,000,000. These oil and gas leases cover allotted lands and are made for a period of 10 years, or as long as oil and gas are found in paying quantities. The leases provide for a royalty of one-eighth of the gross proceeds of the sale of the oil. Leases have also been made on the Ponca, Pawnee, Kiowa, Sac and Fox, Otoe, and Cheyenne and Arapaho Indian Reservations in Oklahoma, and on the Shoshone Indian Reservation in Wyoming, but the production from these reservations has been small. Recently leasing has been greatly stimulated on the Kiowa Reservation by bringing in a well with an initial production of several hundred barrels per day.

The Five Civilized Tribes.—These tribes in Oklahoma have an area of 19,525,966 acres, of which 15,794,208 acres have been allotted to the enrollees or their heirs. Restriction against alienation by allottees has been removed against 12,825,196 acres, or all but about 18.3 per cent of the entire allotted area. One hundred and thirty-nine thousand two hundred and eighty-four acres have been reserved for town sites, churches, schools, cemeteries, etc. The total enrollment of the Five Civilized Tribes, including freedmen, is 101,506, of which number 78,101 are citizens by blood, adoption, or intermarriage, 26,774 being full-blood citizens and 23,405 freedmen; 23,441 are still in the restricted class. Three million five hundred and fifty-eight thousand one hundred and sixty-five acres of tribal land sold for $20,249,032.58, being $4,505,563 more than the appraised value, an average of $5.39 per acre.

There were constructed during the year 127 houses at a cost of $134,466.67; 51 barns at $22,912.95; and 96 wells at $8,093.94. There were purchased 472 horses and mules at a cost of $63,739.78; 494 cattle at $35,766.84; 509 hogs at $13,088.66; and 228 wagons at $35,092.15. Miscellaneous farm implements were purchased at a total cost of $25,544.10. There was disbursed on account of per capita payments, improvements, and individual cash payments to Indians, including salaries and expenses, a total of $12,455,146.08. There was received of individual and tribal funds and congressional appropriations a total of $16,175,520.73, showing a grand total of all money handled for the Five Civilized Tribes during the fiscal year of $28,630,666.81.

PENSION OFFICE.

New legislation.—New legislation has materially increased the work of the Pension Bureau during the year.

Increased rate of $25 for certain widows.—Section 314 of what is known as the war-risk insurance act, approved October 6, 1917, reads as follows:

> SEC. 314. That from and after the passage of this act the rate of pension for a widow of an officer or enlisted man of the Army, Navy, or Marine Corps of the United States who served in the Civil War, the War with Spain, or the Philippine insurrection, now on the pension roll or hereafter to be placed on the

pension roll, and entitled to receive a less rate than hereinafter provided, shall be $25 per month; and nothing herein shall be construed to affect the additional allowance provided by existing pension laws on account of a helpless child or child under sixteen years of age: *Provided, however,* That this act shall not be so construed as to reduce any pension under any act, public or private: *And provided further,* That the provisions of this section shall be administered, executed, and enforced by the Commissioner of Pensions.

There are now on the pension rolls, receiving the rate of $25 per month provided by this act, 283,515 widows of officers and men of the Civil War, and 1,093 widows of those who served in the War with Spain and the Philippine insurrection, making a total of 284,608.

It will be observed that widows of those who served in the Regular Establishment, in the War of 1812, the War with Mexico, the various Indian wars, and the War of 1917 down to October 6, 1917, are not included unless the soldiers on account of whose service pension is claimed rendered service also either in the Civil War, the War with Spain, or the Philippine insurrection.

Neither are Army nurses, dependent parents, or helpless children given the benefit of the increased rate of $25 per month provided by this act.

Limitation of the jurisdiction of the Pension Bureau.—Section 312 of the act of October 6, 1917, contained a provision that existing pension laws should not be applicable after that date to persons then in, or thereafter entering, the military or naval service, or to their widows, children, or their dependents, except in so far as rights under any such law should have theretofore accrued.

An amendment to this section approved June 25, 1918, reads as follows:

SEC. 312. That compensation under this article shall not be paid while the person is in receipt of service or retirement pay. The laws providing for gratuities or payments in the event of death in the service and existing pension laws shall not be applicable after the enactment of this amendment to any person in the active military or naval service on the sixth day of October, nineteen hundred and seventeen, or who thereafter entered the active military or naval service, or to their widows, children, or their dependents, except in so far as rights under any such law have heretofore accrued.

Under the provisions of section 312 as it was originally enacted, it was held by the Department of the Interior that the Pension Bureau had no jurisdiction of widows' claims based upon the service of officers and enlisted men who died subsequent to October 6, 1917, while they were borne upon the retired list of the Army or Navy.

The effect of section 312 as amended June 25, 1918, is to restore to the Pension Bureau jurisdiction in claims of this character which it had exercised prior to October 6, 1917, and it has been determined by the Secretary of the Interior that this renewal of jurisdiction takes effect from October 6, 1917, and that it is not necessary for the widow of a retired officer or enlisted man, who filed an application subsequent to October 6, 1917, to file another application to secure the benefits of the act of June 25, 1918.

All of the archives relating to claims for pension on account of the service of soldiers, sailors, and marines since the foundation of the Republic up to October 6, 1917, are on file in the Pension Bureau. These comprise the pension history of the Government in all its various forms. They also include the individual military and naval history of each claimant for pension and all the claims and personal narration of military history which are continually resorted to by descendants who are proud of the records of their ancestors, and this use is multiplying as time advances. There is in the Pension Bureau a voluminous and continuous record of pension matters without a break from the beginning.

The act of October 6, 1917, takes away from the Pension Bureau the jurisdiction of claims based upon service rendered on and after that date. In this act the bounty of the Government is referred to as "compensation" instead of "pension," but the purpose and meaning of the terms are the same.

Article III of this act provides for compensation "for death or disability," and section 312 provides that, as hereinbefore stated, existing pension laws shall not be applicable after October 6, 1917, to persons then in or thereafter entering the *active* service, "or to their widows, children, or their dependents, except in so far as rights under any such law shall have heretofore accrued."

Increased rates to soldiers of the Civil War.—The act of June 10, 1918, adds to the act of May 11, 1912, a new section, as follows:

> SEC. 6. That from and after the passage of this act the rate of pension for any person who served ninety days or more in the military or naval service of the United States during the Civil War, now on the roll or hereafter to be placed on the pension roll and entitled to receive a less rate than hereinafter provided, shall be $30 per month. In case such a person has reached the age of seventy-two years and served six months, the rate shall be $32 per month; one year, $35 per month; one and a half years, $38 per month; two years or over, $40 per month; *Provided*, That this act shall not be so construed as to reduce any pension under any act, public or private: *Provided, further*, That no pension attorney, claim agent, or other person shall be entitled to receive any compensation for presenting any claim to the Bureau of Pensions under this act, except in applications for original pension by persons who have not heretofore received a pension.

This legislation provides a minimum rate of $30 per month for all soldiers who served in the Civil War for a period of 90 days and were honorably discharged, and the maximum rate of $40 on account of age and service only to those who served two years or more and have attained the age of 72 years.

There were on the rolls at the date of the passage of this act 300,992 pensioners who served in the Civil War.

This act being mandatory in its terms, an earnest effort was made by the Pension Bureau to comply with its requirements at the earliest possible date. A large number of employees were detailed to form a section having charge exclusively of the work of allowing the increased rates provided for. Every division in the Pension Bureau was unusually diligent and active in aiding and carrying out this arrangement, and all employees with commendable energy have cooperated in doing all that could be done to secure to the pensioners as promptly as practicable the increased rates provided by law.

All pensioners on the roll are paid quarterly. The pensioners are, as required by law, divided into three groups, each group being paid once every three months, from which it results that a payment is made every month to one or the other of these groups.

The time intervening between the approval of the act of June 10, 1918, and July 4, 1918, date of next payment, was not sufficient to permit the payment of any of the increased rates on July 4, because the preparations for that payment had already been largely completed. Everything was, however, made ready for making each successive payment thereafter at the increased rates.

It will be noted that this act of June 10, 1918, was an amendment to the act of May 11, 1912. Those who had never been allowed pension under the act of May 11, 1912, and whose age and length of service had never been determined under that act, including those pensioned under what is known as the "general law," because of a wound or other disability incurred in the service, and those pensioned under special acts of Congress were required to file a formal declaration under the act of May 11, 1912, in order to secure the benefits of the increased rates provided by the act of June 10, 1918.

Special acts of Congress.—During the year only one omnibus bill to grant pensions by special act of Congress was enacted into law. This act was approved June 8, 1918, and granted pension or increase of pension to 199 individuals.

Pensions surrendered.—During the year there were 84 pensions voluntarily surrendered, a fact which is very unusual in the history of the Pension Bureau. It is interesting to note that in these cases 49 pensioners gave patriotic reasons—intention of reenlistment, or desire to help the Government, the Red Cross, or the Young Men's Christian Association; 9 stated that their disability had ceased; 1 widow pensioner said that she did not believe in war and refused to receive a war pension; another that her alleged helpless child had improved and could work; another, confronted with evidence that she had a husband living in Germany at the time of her marriage to the soldier, voluntarily surrendered her pension and refunded by check the full amount previously paid; 23 gave no reasons.

Beside the number above given there were 18 who again entered into the military service, and this fact created a presumption of the cessation of disability.

Many other pensions were discontinued for legal reasons such as usually occur, but a great many were peculiar because of the fact that discontinuance was on account of the present war.

Number of pensioners.—There were on the roll at the end of the fiscal year 646,895 names, a net loss of 26,216 from the total of 673,111 on the roll at the beginning of the year.

The number of Civil War soldiers on the roll June 30, 1917, was 329,226, and on June 30, 1918, 298,808, showing a decrease of 30,418. The number of deaths of Civil War soldiers in 1918 was 30,466, which lacked 2,766 of being as many as occurred in 1917, when the number of such deaths was 33,232.

The number of Civil War widows on the roll June 30, 1917, was 284,216, and on June 30, 1918, 288,815, showing an increase of 4,599.

The deaths of widows, minor children, and dependents in 1918 numbered 18,412, as against 20,130 in 1917.

The highest number of Civil War soldiers on the roll was in 1898, when there were 745,822. The highest number of Civil War widows on the roll was in 1912, when there were 304,373.

Of the War of 1812, there were surviving on June 30, 1918, 99 widows.

Of the War with Mexico, there were on June 30, 1918, 289 survivors and 3,064 widows.

Of the War with Spain, the total number of original claims allowed by the bureau is 39,786. The number of Spanish War soldiers on the roll at the end of the fiscal year was 27,513.

Unexpended balances of appropriations.—The unexpended balances of appropriations at the end of the fiscal year were as follows:

For Army and Navy pensions	$3,241,471.90
For fees and expenses of examining surgeons	36,244.07
For salaries	104,537.59
For per diem and expenses of special examiners	271.34

Disbursements for pensions.—The amount disbursed in the payment of pensions for the year was $179,835,329, as against $160,895,054 for the preceding year. The amount appropriated for the payment of pensions for the fiscal year 1918 was $183,000,000, as against $163,000,000 for the preceding year. A deficiency appropriation of $23,000,000 was made in addition to the original appropriation of $160,000,000 for the fiscal year. The larger amount was because of increases given by new legislation.

The number of pensioners residing in foreign countries in 1918 was 4,057. The amount paid to pensioners in foreign countries was $983,688.

Certificates issued and applications filed.

Pension certificates issued on admitted claims during the fiscal year	41,034
Reissues in lieu of lost pension certificates (duplicates) during the year	1,545
Accrued pension orders issued during the year	16,047
Widow's increase orders, act of Sept. 8, 1916, issued during the year ending June 30, 1918	8,348
Total	66,974

There were received and classified in the Law Division during the year 47,922 applications of all kinds, 20,567 of which were under sections 2 and 3 of the act of September 8, 1916.

Division of Pension.—Under the act of March 3, 1899, providing for division of pension of resident pensioners of the United States who have deserted their wives or children or who are inmates of soldiers' or sailors' homes, 2,363 cases have been acted upon.

Under the act of August 8, 1882, of claims of widows and children of pensioners undergoing imprisonment or insane without a guardian, 82 cases were acted on.

Metal boxes for files.—There are over 2,000,000 of pension-claim files, all placed in the upper story of the Pension Building. A large number of them are held together by a leather strap, about 50 being included in one bundle. To have access to a single case it is necessary to unstrap the whole unwieldy bundle with great labor and to perform the same task on replacing the file. All this work is saved when the metal box is used.

Because of recent legislation it was necessary to handle nearly the entire number of more than 650,000 cases on the pension roll in order to increase the pensions of the widows and latterly the soldiers and sailors.

The increase to the widows was first to $20 and then to $25, so that the number of their files, amounting to over 200,000, was necessarily handled twice; altogether that would make nearly 900,000 times that it was necessary to have access to the files. This is all in addition to the number of times they are required to be handled in the ordinary business of the Pension Bureau.

For purposes of reference and historical use, after the occasion has ceased for pensionable purposes, it will be necessary to have access to the files with growing frequency. We think in the metal boxes the files will be more secure, freer from dust and danger from fire, and more easily accessible at all times.

Ages of employees.—The following statement shows the number, ages, etc., of employees in the Pension Bureau on the 1st of July, 1918:

Number in classified civil service	925
Age of oldest employee	87

Number over 80 years of age	24
Number between 70 and 80 years of age	168
Based on age of 70 years, number eligible for retirement	192
Percentage of all employees eligible for retirement	20.75

The average age of employees in December, 1917, was 57 years.

PATENT OFFICE.

The total number of applications received for patent in 1917 was 71,620, and in 1918, 64,979, a decrease of 6,641 from the prior year. The total number of applications awaiting action on June 30, 1917, was 16,058, and the number of applications awaiting action on June 30, 1918, was 14,769, a decrease of 1,289. The total number of patents granted in 1917 was 44,179, and the total number in 1918 40,526, a decrease of 3,653.

The total receipts of the office were $2,103,660.56, and the total expenditures for all purposes were $2,131,616.18, making a net deficit of $27,955.62 for the year.

During the fiscal year ended June 30, 1918, there were filed 62,399 applications for patents for inventions, 2,367 applications for patents for designs, 213 applications for the reissue of patents previously granted, 7,282 applications for registrations of trade-marks, 763 applications for registration of labels, and 283 applications for registration of prints, the total number of such applications being 73,307. This represents a decrease of 8,231 from the applications filed in 1917.

In addition, 2,072 appeals and 19 disclaimers were filed. During the year 40,526 patents (including 1,146 designs and 166 reissues), 4,844 registrations for trade-marks, 516 registrations for labels, and 192 registrations for prints were granted. The number of patents which expired during the year was 24,593. The number of allowed applications which were forfeited for nonpayment of final fees was 9,513. The total receipts of the office during the year were $2,102,660.56 and the total expenditures were $2,131,616.18, making a net deficit of $27,955.73. The grand net surplus of $8,219,071.35 from the establishment of the present patent system in 1836 to 1917 is, therefore, reduced to $8,191,115.73.

BUREAU OF EDUCATION.

Correspondence.—First-class mail matter received by the bureau in Washington amounted to 162,479 pieces, an increase of almost 25,000 pieces over the number received in 1917. In addition 29,070 pieces were received at field offices.

Library.—During the year the library collection was increased by 3,031 volumes and pamphlets, 8,801 numbers of serial publications, and 8,913 numbers of periodicals. Considerable progress was made in placing on shelves books that had been placed in storage several years ago.

Publications.—Printed documents distributed during the year numbered 802,835 copies. Approximately 3,600,000 copies of brief mimeographed letters and printed circulars were sent out. The printed documents included the Annual Report of the Commissioner for 1917. Bulletins dealt with such subjects as open-air schools, medical inspection in Great Britain, reorganization of English in secondary schools, current practice in city school administration, department-store education, development of arithmetic as a school subject, higher technical education in foreign countries, higher education in Ireland, Wales, England, and Scotland, accredited higher institutions, history of public education in Delaware, educational surveys of Arizona, San Francisco, Cal., and University of Nevada, money value of education, practice teaching for secondary school teachers, salaries of rural and urban superintendents of schools, demand for vocational education in the countries at war, vocational teachers for secondary schools, teaching English to aliens, summer sessions in city schools, preparation and preservation of vegetables, music in secondary schools, physical education in secondary schools, moral values in secondary education, training in courtesy, agricultural instruction in high schools of six eastern States, a community center—what it is and how to organize it, land grant of 1862 and the land-grant colleges.

Educational surveys.—Thirteen different surveys of educational systems and institutions were carried on during the year, of which number eight were begun during preceding years. In South Dakota a survey was made, at the request of the State legislature, of the entire educational system of the State, including all schools and educational institutions supported by public funds. A survey of the schools of Columbia, S. C., was made at the request of the board of education of that city.

Other projects.—The division of higher education completed and issued bulletins on statistics of State universities and State colleges and on accredited higher institutions. It completed also a study on standards and resources of colleges of liberal arts and rendered decisions on the eligibility of 536 universities, colleges, and secondary schools for accrediting by the United States Military Academy.

In the field of school administration three projects, aside from surveys, were completed—a bulletin on summer sessions in city schools, digest of State laws relating to libraries, and digest of educational legislation enacted in 1916 and 1917.

A conference on physical education was held at Atlantic City, N. J., under the auspices of the bureau on February 26, 1918, which resulted in the adoption of a program calling for Federal legislation for the promotion of physical education. Assistance was rendered by the special agent in schoolhouse construction to school boards in Alabama, Arkansas, Kentucky, Tennessee, and other States in the planning of school buildings.

In agricultural education three studies have been completed—organization and administrative relationship of the colleges of agriculture, work of the land-grant colleges in the training of teachers for vocational subjects, organization for instruction and requirements for admission and graduation of the several agricultural colleges.

Conferences of specialists in the preparation of teachers for industrial schools were held under the bureau's auspices at the University of Missouri and at Philadelphia, Pa., and conferences of supervisors of home economics in public schools were held at Portland, Oreg., and in New York City.

In connection with the campaign for the improvement of rural-school conditions, conferences were held during the year at St. Paul, Minn.; Hot Springs, Ark.; Denver, Colo.; Butte, Mont.; Chico, Cal.; which were followed by a national conference at Washington, D. C., in February, 1918. Assistance has been rendered to State school officials in New Mexico in formulating new school legislation; in Arkansas in the revision of constitutional provisions relating to education and in the revision of the State school code; and to the school officials in West Virginia in revising the State school code. Other specific projects under way in rural education are: Study of rural-school consolidation in the United States and Canada, rural high-school education with special reference to junior high-school organization, immediate problems in rural education—what principles should govern their solution and what steps should be taken toward meeting them, study of teacher certification in the United States, and minimum requirements of the ideal one-teacher community.

Three studies in kindergarten education were completed—methods of organizing kindergarten classes in city school systems, practical suggestions for kindergarten and primary teachers with regard to social guardianship of young children during the war, and review of recent publications of special interest to kindergartens. A series of 55 articles on kindergarten methods for mothers were prepared and issued to the newspapers of the country and proved very popular. More than 2,000 newspapers and magazines, having an aggregate circulation of 32,000,000, have requested the articles. The bureau is continuing its efforts in behalf of kindergarten legislation, with the result that in 18 States campaigns are now under way for better laws.

Two additional home reading courses were prepared and issued—No. 7, Thirty World Heroes, and No. 9, Thirty American Heroes.

More than 7,000 readers are now enrolled in the national reading circle and 160 have finished one or more courses and have been granted certificates.

An important conference was held in August, 1917, in the auditorium of the Interior Department Building in Washington for the discussion of problems relating to the education of the Negro, which resulted in the appointment of a committee to study various phases of the problem. Reports by subcommittees have already been prepared on educational standards, financial aid, and cooperation of private agencies.

Alaska.—During the year 69 schools were maintained for the education of natives, with an enrollment of 3,700 pupils. Four school buildings and one teacher's residence were erected. The field force in Alaska consisted of five superintendents, one assistant superintendent, 116 teachers, 9 physicians, and 11 nurses.

On Annette Island fish-trapping privileges and permission to erect and operate a fish cannery have been granted to the Annette Island Packing Co., of Seattle, by lease. It is expected that the revenue accruing from this lease will make it possible to take over, for the Metlakatlans, the property of the lessee within the Annette Island Fishery Reserve and to arrange for the operation of the cannery by the natives.

In May, 1916, representatives of the Bureau of Education succeeded in organizing among the natives the Metlakatla Commercial Co., with a capital of $2,255 and 30 shareholders to conduct the mercantile business of the settlement. The auditing of the affairs of the company in January, 1918, showed a capital of $14,985 at that date and a net profit of $4,033.30 for the year. The number of stockholders had increased to 110. In addition, the company had rehabilitated and operated the sawmill and had furnished lumber for the cannery buildings and for other buildings in the village.

The income and wages resulting from the cannery lease, guaranteed through five successive years, and the prosperity of its commercial company, assure the economic restoration of the Metlakatla colony.

The honor of taking the first step in assuming a part of the expenses of their medical service belongs to the natives of Hoonah, who, during the latter part of the year, paid the salary of a physician and started a fund for the erection of a hospital in their village.

Education and the war.—Probably the most important work of the bureau in connection with the war has been, first, in keeping before the people, and especially before officers of colleges, universities, and technical schools the necessity of maintaining a supply of educated and trained men and women for direct or indirect war service, and, second, in bringing the people of the country at large to understand that it is the desire of the administration that the schools and other agencies of education should be maintained as nearly as possible at their normal efficiency during the war and that, in so far as it may be, there shall be no falling off of attendance in the schools of any grade, and in making sentiment sufficiently strong to maintain this policy. To this end many thousands of copies of letters and circulars of information and appeal have been sent to governors of States, mayors of cities, boards of trade, officers of labor organizations, women's clubs and civic bodies, and State, county, and local school officers, officers of colleges, universities, and technical schools, and the public press. Ministers have been asked to present the cause of education from their pulpits and otherwise, the cooperation of Chautauqua lectures has been enlisted, and many conferences and public meetings have been held. Advice and counsel have also been given in regard to the reorganization of schools and as to changes in schedules and courses of study to meet the demands of the war emergency. Legislatures and municipal tax-levying bodies have been urged to make provision for such increase in school funds as is needed to meet the necessary increase in the wages of teachers and other expenses on account of the increase in the cost of living and the wages paid for labor and other forms of service. All this has been done "to the end that no boy or girl shall have less opportunity for education because of the war, and that the Nation may be strengthened as it can only be through the right education of all its people."

The response of the people and their representatives in all parts of the country has been gratifying. The efficiency of the schools has been maintained in a larger degree than was expected by most. There has been little falling off in attendance. Appropriations for salaries of teachers have been increased in many States and cities. Although many teachers have gone into the Army or the war industries, a large majority have remained at their posts as a patriotic duty, regardless of the temptations to much higher pay elsewhere.

The war has brought home to our people the urgent necessity for increased food production and for the conservation of man power and transportation facilities. The success of home gardening under school direction, which has been promoted by the bureau since 1914, was proof that a general adoption of the plan by all cities and towns would materially assist the food problem. With this end in view the President, in February, 1918, allotted the sum of $50,000 to be used in the promotion of home gardening under school direction during the following six months. The bureau immediately organized the United States School Garden Army, and enrolled during the first few months 1,500,000 boys and girls. Twenty-five thousand acres of unproductive home and vacant lots have been converted into productive land; 50,000 teachers have received valuable instruction in gardening through leaflets prepared by garden experts in the bureau.

The work accomplished during the first few months has been so successful that the President has made provision for its continuance during the fiscal year ending June 30, 1919.

The bureau has continued its work for the Americanization of foreign-born residents. The need for this work was greatly accentuated by the war, which brought into the Army large numbers of men who did not know the English language. To assist in placing Americanization before the country as a war measure, the Secretary of the Interior called a conference on April 3 of all the governors, chairmen of State defense councils, and presidents of industrial corporations and chambers of commerce. About 300 attended this conference. Resolutions were adopted calling upon Congress to appropriate adequate funds to the respective Federal departments doing Americanization work, indorsing the principle of Federal aid in Americanization to States and communities, urging industrial and commercial organizations to cooperate with Federal and State authorities in a Nation-wide plan, and recommending that all elementary instruction in all schools be conducted in the English language.

On May 2, 1918, the Secretary of the Interior accepted a proposition from the National Americanization Committee of New York for the extension of the bureau's work in Americanization with a special view to extending the work of education among the foreign-born population of the United States, in order to give them a knowledge of the industrial requirements in this country, of the history and resources of the country, of our manners and customs, and of our social, civic, economic, and political ideals, and through cooperation with loyal leaders of racial groups to win the full loyalty of these people for the United States and their hearty cooperation in the war for freedom and democracy. Under the plan of cooperation adopted the National Americanization Committee bears the additional expense for salaries and travel of specialists, assistants, clerks, and other employees, as well as the necessary expenses for office equipment. All employees are selected by the Commissioner of Education and appointed by the Secretary of the Interior.

Recommendations.—The commissioner renews his recommendations for an assistant commissioner, additional specialists in higher education, rural education, industrial education, commercial education, city school systems, and foreign educational systems. He urges a much larger appropriation for school and home gardening and provision for a school board service station to continue the work now carried on through an allotment of funds made by the President; more adequate provision for investigation and promotion of school sanitation, school hygiene, physical education, and community organization. He asks that provision be made for the investigation of the education of exceptional children and of adult illiterates, and for cooperation by the bureau with schools of education and educational systems in making investigations and experiments in elementary and secondary education under scientific control and with State and county school officers in establishing and maintaining model rural schools for demonstration purposes. He calls special attention to the necessity for appropriations to carry on the work of the divisions of negro education, home education, and Americanization, which are now wholly maintained by cooperating agencies, and that of the kindergarten division which is partly maintained by such agencies, the present plan of cooperation becoming illegal after June 30, 1919. To expedite the clerical work of the bureau he asks for a specific appropriation for labor-saving devices.

For the work in Alaska the commissioner asks for increases in the appropriations for education, medical relief, and reindeer.

GEOLOGICAL SURVEY.

Nature of the survey's work.—The work of the survey during the year has been directed mainly to the end of helping to win the war, the routine areal geologic and topographic mapping having been practically suspended. The geologists have been employed chiefly in examining and estimating deposits of "war minerals," particularly of ores containing the steel-hardening metals manganese, chromite, and tungsten, and in discovering areas that promise an immediate yield of oil and gas. The topographic engineers have been employed chiefly in military mapping along the borders of the country and in other work performed in cooperation with the War Department. The hydraulic engineers have been employed partly in investigations of the water supplies available at camps and cantonments. The survey's statistics of mineral production and resources have been put at the service of the governmental war boards and have been of special value.

The appropriations for the work of the survey for the fiscal year 1918 amounted to $1,750,520. The roll of survey members holding appointments from the Secretary at the end of the fiscal year numbered 1,000, an increase of 66 during the year.

Geologic surveys.—The survey's geologists have in every serviceable way cooperated with branches of the military departments and boards of the Government. During the year 90 geologists made investigations of mineral deposits of military value in 47 States, the West Indies, the Canal Zone, Central America, and South America, the localities visited numbering more than 1,600. Systematic investigations have been made to discover areas likely to yield immediately considerable supplies of oil and gas, and cooperation with the Fuel Administration has made all the geologic data obtained immediately available for use in directing new drilling. Work has been done on deposits of coal, iron-alloy and steel-alloy metals, platinum, mercury, copper, potash, nitrates, phosphate, and cements. Surveys and examinations have been made at Army and Navy training camps, cantonments, and stations and in adjacent areas, and descriptions and maps of some camps have been prepared and printed, showing, as a means of military education, the topographic and geologic elements of the areas mapped that should be considered in military operations.

In view of the restrictions now imposed on the importation of mica, studies were made in the field and in the survey's laboratory of the several varieties of domestic mica available for commercial use, in order to direct, encourage, and increase the domestic production of this mineral, which is used in wireless apparatus, airplanes, and motor trucks. Laboratory work was done on nitrate, potash, mica, and other war minerals and on ores of the iron-alloy and steel-alloy metals manganese and chromium.

Surveys in Alaska.—Eleven parties were at work in Alaska during 1917, nine of them in making geologic surveys, one in making topographic surveys, and one in stream gauging. Reconnaissance geologic surveys covering 1,750 square miles and detailed geologic surveys covering 275 square miles were made. About 1,050 square miles was covered by reconnaissance topographic surveys. Much of the time of the geologists was devoted to the study of special problems relating to the occurrence of mineral deposits. Deposits of ores of tungsten, tin, nickel, and platinum, all rare in the United States, were examined, and some were found to offer fair promise of becoming commercially productive.

An all-the-year-round office was established at Anchorage, Alaska, where a resident geologist is at all times available for consultation with miners and for cooperation with the Alaskan Engineering Commission, which is constructing and operating the Alaskan railways.

Statistics of mineral production.—The survey has been the chief source of information for the governmental war boards and other agencies that have required statistics of the mineral production of the United States—its rate and its conditions, present and prospective. Statistics of the production of some war minerals have been gathered and compiled quarterly, monthly, weekly, and for coal even daily. Producers have been informed and encouraged, buyers have been put into touch with producers, metallurgical and mining troubles reported to the survey have been referred to the Bureau of Mines or other appropriate bureau or organization, and help has been extended to producers in procuring cars, fuel, and supplies.

The survey took the initiative in organizing a joint information board, representing 36 divisions and bureaus, to furnish replies to interbureau inquiries concerning mineral deposits. A special feature of its work was the study of the mineral resources of the world and the preparation of maps showing the location and extent of all known deposits. It also prepared reports to the Capital Issues Committee on mineral properties and many special reports on war minerals for other bureaus and boards and cooperated with the Bureau of Standards, the Bureau of Mines, and the Office of Public Roads in investigations and tests of building material, clays, and road material.

The survey's work of collecting statistics of mineral production covered more than 75 mineral products and included correspondence with 110,000 producers. During the fiscal year 61 advance chapters of the volumes Mineral Resources of the United States, 1916, and Mineral Resources of the United States, 1917, were prepared and published, and advance statements of the production of many minerals were given to the press.

Topographic surveys.—During the year new topographic surveys of 21,955 square miles and resurveys of 476 square miles were made. The work done included 24 new military maps, several maps showing camps, cantonments, and aviation and balloon fields, 24 maps of motor-truck routes, and 25 maps of airplane routes.

The survey continued its work on an aerial panoramic camera and, in cooperation with Army engineers, made aerial photographic surveys and prepared for publication maps made from aerial photographs.

The results of topographic surveys in Alaska are stated elsewhere.

Water resources.—Special hydrologic field investigations and office studies were made for bureaus and boards engaged in the conduct of the war, to which manuscript reports were submitted. Problems in regard to water supplies for military and naval establishments in different parts of the country were studied, and reports were made to the War and Navy Departments on ground-water supplies at about 50 localities.

Under the provisions of the act of Congress approved August 21, 1916, surveys were made of a desert region in southern California and southwestern Arizona embracing 60,000 square miles, in which samples of water were collected for analysis and 635 permanent signs directing travelers to water were erected. Exploratory wells were drilled for water in a desert area in Nevada with favorable results. The area was carefully surveyed, and information for a full report on it was obtained. The maps made and the data collected were made available to the Army engineers for incorporation into the progressive military map of the United States now in preparation.

Stream gauging was continued at 1,182 stations in the United States and Hawaii, and work was done on ground water in 20 States, Alaska, and the District of Columbia. Numerous analyses of water were made, and about 1,500 analyses made elsewhere were recalculated and reclassified.

During the year a division of power resources and a division of enlarged and stock-raising homesteads were organized to perform work indicated by their titles. A comprehensive power survey of the country—work that includes both statistics and engineering—was well begun, to the end that water power may be substituted for power generated by coal at all places where substitution is possible, or that coal may be saved by interconnecting electric plants or systems. Reports were made to the Capital Issues Committee covering power and water systems seeking authority for new development or enlargement. Field investigations of lands applied for under the enlarged-homestead and stock-raising homestead laws were made in 11 States.

Land classification.—Public lands aggregating 9,972,256 acres were classified as coal lands, and recommendations were made for the withdrawal from entry of 9,369 acres of coal land and the restoration to entry of 1,105,622 acres.

Probable oil lands amounting to 171,247 acres were reported for withdrawal, and areas amounting to 117 acres heretofore withdrawn were reported for restoration. The result of this year's work was an increase of oil reserves from 6,348,640 to 6,519,770 acres. Indian lands aggregating 42,097 acres were classified as oil lands.

Probable phosphate lands amounting to 248,030 acres were reported for withdrawal, and 30,034 acres of lands previously withdrawn for examination as to their content of phosphate were reported for restoration to entry.

Lands aggregating 5,161,080 acres were designated as nonirrigable under the enlarged-homestead acts, and the designations of 445,083 acres previously classified as nonirrigable were canceled. At the end of the year 280,349,850 acres had been classified as nonirrigable.

Under the stock-raising homestead act 7,538,962 acres of land were designated and final action has been taken on nearly 15,000 out of 49,000 applications for stock-raising homesteads.

Recommendations were made for the withdrawal of lands believed to be available for use as power sites aggregating 137,505 acres and for the restoration of lands previously so withdrawn aggregating 2,230 acres. Railroad-grant lands in Oregon aggregating 109,508 acres, part of which is not included in the aggregate just given, were classified as power sites.

Lands amounting to 4,756 acres were reported for withdrawal as public water reserves, and 1,830 acres previously so withdrawn were reported for restoration to entry.

The survey cooperated with the General Land Office by reporting on 3,871 cases other than those involving enlarged homesteads and stock-raising homesteads and also considered 1,434 reports on field examinations made by that office and acted on 1,390 reports.

Publications.—During the year the survey's lithographic plant has been occupied much of the time on work for bureaus, boards, offices, and other branches of the Government that are engaged directly in the prosecution of the war. The work done has included 24 special new topographic military maps, several maps showing camps, cantonments, and aviation fields, 24 maps showing motor-truck routes, 25 maps showing airplane routes, maps of Belgium and of parts of France, sheets showing conventional signs used on French and British maps, 84 British Admiralty charts, 147 hydrographic charts, and numerous other maps, charts, diagrams, and illustrations, including colored camouflage charts for the Navy and recruiting posters. Township and mineral plats and plats of grants and reservations, aggregating about 2,300 subjects, were printed for other bureaus and offices of the Interior Department, and work was done for 15 bureaus and offices in other departments, exclusive of the war work reported. In all 3,272,430 copies of maps, charts, etc., were printed during the year.

The survey published during the year 304 maps of areas in the United States, in editions aggregating 703,832 copies. Of its regular series of publications, printed at the Government Printing Office, it issued 163 reports, aggregating 14,277 pages. During the year it distributed 576,655 books and 530,706 maps.

The survey cooperated with the Coast and Geodetic Survey and the Army War College in translating from the French a manual of military mapping and technical instruction designed for use in artillery work, and published it for the use of its engineers and other American engineers in France.

RECLAMATION SERVICE.

Including considerable tracts of land under private canals, dependent in whole or in part on the Government works for water, the total area to which the United States could deliver water during 1917 from the works built under the reclamation law was about 2,000,000 acres, of which the project statistics covered an area of approximately 1,500,000 acres; of this slightly over 1,000,000 acres were actually irrigated. This was an increase of 50,000 acres over that irrigated in the season of 1916. The entrance of the United States into the European war in the spring of 1917 presented a situation necessitating an increase in the production of food by every feasible method, but the season was already well advanced and all that could be done under the circumstances is represented by the above figures.

The efforts to increase the production were continued during 1918, and where cultivation could not otherwise be secured some of the uncultivated public lands were leased temporarily to those who would cultivate. This materially increased the production on the projects by utilizing land that would otherwise be vacant and by placing these lands in the hands of men who were generally stronger financially than the average settler and able to secure a greater return the first year.

Incidentally the experience in this line has proved this policy to be very beneficial. The leasing method brings the land into cultivation under terms by which it is cleared, leveled, supplied with farm ditches, broken up, and cultivated so that the sod is well rotted and the land reduced to a better state of tillage, and the chances of success on the part of the future settler thereby greatly increased. Experience has demonstrated that it would be a wise policy to continue this practice of preparing the lands for the incoming settler irrespective of war requirements. By leasing the land for two or three years this service is secured without cost to the United States and with great benefit, not only to the settler but to the Government, in better security for the repayment of construction charges by the settler. This policy is being gradually and carefully extended where it can be done without interfering with the natural course of settlement on the projects—always keeping in mind the interests and requirements of the actual settler whose welfare and prosperity are the first concern of the law and its administration.

Principal operations on the projects.—The principal work of the Reclamation Service during the past year has been the operation of the various projects which have been constructed or partly constructed by the service. Next in importance have been the continuation and extension of drainage work where required to prevent injury of reclaimed land and to lower the ground water where this has become injurious. In addition, numerous minor extensions of projects have been constructed, bringing under irrigation increased acreages where these could be made productive in the immediate future.

The general policy has been not to undertake new projects or any large extensions of existing projects unless it would be possible thereby to bring about increased production of food and forage in the immediate future. This policy has been prompted by the necessity of conserving the labor and materials of the country for essential industries and those contributing to the winning of the war.

In accordance with this policy, the work of constructing a reservoir on the Tieton River in the State of Washington, which was started before the United States entered the war, was recently discontinued. Experience had shown the impossibility of keeping the labor forces anywhere near the economical point and the organization was accordingly disbanded and the work brought to a close to be resumed after the end of the war.

The only new project undertaken recently is the King Hill project in southern Idaho, where private capital had constructed an irrigation system, but was unable to complete it. The constructed works, built largely of wood, were rapidly falling into decay and the community settled under the project was threatened with ruin by the failure of their water supply. The original investors lost their entire investment, and the State purchased the works under foreclosure. These were turned over without cost to the United States, and the process of reconstruction and completion was started in 1918 and is now in progress. The old work has failed at several points, and it is probable that if the United States had not stepped into the breach the water supply would now be cut off and the crops destroyed. Important repairs have been made and the work of reconstruction is well under way.

The Salt River project, Arizona, has been turned over to the water users' association to operate, and the association has by contract been granted the income of the power plants constructed in connection with the project. It is in a very prosperous condition. Its construction is completed and its connection with the Government is confined to occasional inspection and supervision and the collection of construction charges.

On the Yuma project, Arizona-California, the construction work has been confined to small extensions of the lateral system, drainage work, and river-front protection. The project is in the most prosperous condition it has ever been, the average gross yield of cultivated lands being nearly $100 per acre, and many of those best handled running far above this figure. Public notice annonucing construction charges was issued in 1917, and first payments fell due on December 1 of that year. Most of these have been paid, part of them under protest. The water users' association is contesting the payment of construction charges in the courts, but the case has not yet been brought to trial. Preparations are being made for constructing the Yuma Mesa pumping project, which will be irrigated with water pumped from the main canal south of the city of Yuma. Negotiations are also pending with the Imperial irrigation district to connect their system with Laguna Dam and provide better security for their water supply.

The Orland project in California has been practically completed and forms the first unit of a larger Sacramento Valley project. Public notice on the Orland project was issued in 1917, and the first payments were made on the 1st day of December of that year, in one check, by the association paying all of the accrued charges and assuming all risk of delinquency on the part of the shareholders. The project is prosperous and constantly growing in development. The only construction work remaining is a small amount of canal lining, which was provided for in the funds covered by the current public notice.

The Grand Valley project in Colorado has been so far completed that water was delivered on a rental basis to portions of the land in 1917 and to a larger portion in 1918. About 5,000 acres have been opened to entry and occupied by settlers. Some extensions of laterals and betterment work on the new canals and laterals are under way. The agricultural operations are gradually extending and the results encouraging.

A contract has been concluded with the water users' association of the Uncompahgre project, Colorado, by which the United States will operate the project for a period of five years on the payment of the cost thereof by the water users' association. At the end of this period the project is to be opened under public notice, unless the period is further extended by the Secretary of the Interior. The construction of the project is practically completed, and only a few minor betterments are being made. The cultivation of the lands is gradually extending, and slow improvement is being made in the use of water, which is very wastefully applied to the lands. Efforts are being made to introduce the rotation system and to apply other methods of securing the best use of the water supply and thus reduce the growing menace of a rising water table and destruction of fertility of the land by excessive application of water. Agriculture is successful and the settlers are generally prosperous.

On the Boise project in Idaho the Arrowrock and Deerflat reservoirs have been completed and the canal system covers the main body of the project. Contemplated extensions will be gradually made to conform to better practices regarding the use of the water, which is sufficient for irrigating about 40,000 additional acres of land if used with reasonable economy. Public notice was issued in 1917, announcing the charges on the completed portion of the project and fixing December 1, 1918, as the due date of the first payment. This payment has been made by most of the water users, but some have filed protest and the water users' association is contesting these payments in the courts. The case has not yet come to trial.

In addition to the lands for which the United States has constructed irrigation canals, storage water to supplement the previous supply has been sold to the lands under the New York canal and the Pioneer, Nampa and Meridian, and Riverside districts. Storage water was also furnished under special contract to the Farmers Union canal. Agriculture is successful and the settlers are generally prosperous.

The Minidoka project in Idaho, as originally planned, is completed, but several extensions are possible and desirable. Public notices are in effect upon the lands now served with irrigation water and the gravity lands of the project have formed an irrigation district which operates the canal system under contract with the United States. The pumping unit on the south side is operated by the United States. Agriculture is successful, the settlers are generally prosperous, and payments are being promptly made.

The Huntley project in Montana is practically completed and continues to hold its reputation of being one of the most successful and thickly settled projects of the service. Drainage work is being continued and has so far been successful in relieving the lands for which constructed. Construction payments are being regularly made.

In the Milk River Valley, Mont., water is being delivered from the St. Mary River to a canal constructed by the service diverting the St. Mary River just below St. Mary Lakes. This water is being used on a rental basis. Less than one-fourth of the available land is being irrigated.

On the Sun River project, Montana, the completion and seasoning of the canal and lateral system for 25,000 acres on the north side are nearly completed and it is expected that water will be delivered to this tract in 1919. Dry farming has been practiced extensively in this region and the entrymen have protested vigorously against the irrigation system, although they entered their lands subject to payment therefor. There have now been two very dry seasons with accompanying crop failures on the dry lands, and it is believed that irrigation water will be better appreciated in the future. This project is a favorable location for a sugar factory.

The Lower Yellowstone project, Montana-North Dakota, is being operated on a rental basis and less than one-fourth of the lands for which water is available are being irrigated. Steps have been taken to form an irrigation district and arrange for permanent water rights for the lands to be included. A law adapted to such organization of districts was passed by the last Legislature of Montana. This project is also a favorable location for a sugar factory.

The North Platte project in Nebraska and Wyoming continues to be one of the most successful of the reclamation projects. The interstate unit on the north side of the river has been opened under public notice, and is making payments regularly. Cultivation and improvement are steadily extending. Drainage is being constructed to relieve some localities where the water table is high, and considerable areas have already been relieved. The drainage problem, however, is neither extensive nor serious. The Fort Laramie canal on the south side of the river is under construction, and water is being delivered to small tracts under rental order. It is expected that 15,000 or 20,000 acres will receive water service from the Fort Laramie canal in 1919, and progressively more from year to year.

The Truckee-Carson project in Nevada is slowly extending its cultivated area, but on a considerable portion of the project the water table is high and drainage is needed. A local association in the neighborhood of Fernley has organized and entered into obligation to pay for drainage, and the drainage works necessary in that region have been practically completed with successful results. The necessary organization on the south side of Carson River to secure drainage work has not been formed. Slow progress is being made in the settlement of the rights to the use of Lake Tahoe and the storage reservoir, and pending this settlement no further development is feasible.

The Carlsbad project in New Mexico is gradually increasing its cultivated area as the progress of drainage works continues and waterlogged conditions improve. Serious damage was done to the storage reservoir by a great storm in March, 1915; this has, however, been repaired and a new spillway constructed. Two subsequent years, 1917 and 1918, have been abnormally dry and the project has been perilously near water shortage throughout those seasons. No serious reduction of crop yields has occurred and a sparing application of water has resulted in some benefit from the lowering of the water table.

The Rio Grande project, in New Mexico and Texas, is one of the localities of largest operations under the Reclamation Service. Water is being delivered to nearly one-fifth of the lands from the storage reservoir at Elephant Butte. The work is being pushed on construction of the canal system and on the general drainage system of the valley. Much of the land for which water is available is waterlogged and a rising water table threatens other areas. The most urgent work on this project is the completion of the drainage system and the reconstruction of the lateral system by which water can be used more efficiently and economically and the rise of the ground water arrested.

The North Dakota pumping project has not been operated for several years, owing to the failure of the lands benefited to make payment therefor. Two successive dry seasons have demonstrated the necessity of irrigation, and the land owners have taken steps to organize an irrigation district and secure the operation of the canal system. It is believed that this organization will be successfully accomplished.

The Umatilla project in Oregon has undergone rapid development in the last year owing to the completion of the western extension and delivery of water therefrom. The lands cultivated under this extension are showing excellent results and development is expected to continue. Much trouble has been experienced by sand drifting into the canals but this is being gradually overcome.

The Klamath project in Oregon and California is being extended gradually as the waters of Tule Lake recede. Drainage works are also being constructed to counteract the rising water table. Arrangements have been made with the owners of land around Lower Tule Lake for the reclamation of those lands under legislation now pending in Congress to include the public lands affected. This legislation is a necessary prerequisite to this development.

The Belle Fourche project in South Dakota is being extended gradually to cover more land, and the lands already under cultivation are yielding satisfactory results. This project is a favorable location for a sugar factory. Some of the lands on the Belle Fourche project need drainage but arrangements have not yet been made for the repayment of the cost and the plans are suspended awaiting such arrangements.

On the Strawberry Valley project in Utah the new system constructed by the Government is being operated by the irrigators under special contract and payments of construction charges are being regularly made. There are still some sales of rights in the Strawberry Reservoir to be made in order to return the entire cost of the project. Investigations for extensions and the use of water upon other lands are in progress.

The extremely dry years of 1917 and 1918 throughout most of the West have broken all records in this respect, and thousands of head of live stock and many private irrigation projects have suffered for lack of water. The Reclamation Service has experienced serious shortage on only one project, namely, the Okanogan project in northern Washington. The records of water supply for this project for 15 years prior to 1918 show a mean annual yield of 30,500 acre-feet, and a minimum yield of 17,000 acre-feet. The yield for 1918 was less than 10,000 acre-feet, a large portion of which was necessarily applied to lands holding old vested water rights. An emergency appropriation of $125,000 was made by Congress in July, 1918, but little could be accomplished to relieve the water shortage. Pumping plants were installed at Salmon Lake and at Duck Lake which to a limited extent relieved the shortage on some of the lands; but there will be considerable loss upon a portion of the area where the open sandy soil and subsoil have caused an acute condition and the abandonment of some of the farms.

The Sunnyside unit of the Yakima project, Washington, has been extended at the lower end, which is gradually coming under cultivation. The project as a whole is very productive and prosperous. Strong representations are being made to enlarge the main canal and extend it by means of pressure pipe across Yakima River to cover lands known as Kennewick high lands now under pumping plants built by private capital.

The Tieton unit of the Yakima project is rapidly expanding and being devoted to general farming, contrary to first expectation. Although it is an excellent fruit country, the practice is growing of planting legumes between fruit trees in order to produce additional revenue and to build up the fertility of the land. This use has resulted in the requirement of a greater quantity of water than was originally planned, and it has accordingly been necessary to eliminate some of the uncultivated lands and to increase the capacity of the main canal. All charges have been assumed by the irrigation district organized on this unit, and payments are being made regularly and promptly under public notice. The Yakima project as a whole is one of the foremost in general prosperity, and in returning the cost of its construction.

The Shoshone project in Wyoming is being gradually enlarged by extension of canals on the north side of Shoshone River. The drainage system is also being extended under contract with the water users to repay the cost in accordance with law. The project is very prosperous, and payments are being made regularly under public notice.

SUMMARY OF CONSTRUCTION RESULTS.

The following table gives in concise form many of the items which have been accomplished. It will be noted that in spite of labor and other conditions due to the war, the total excavation for the year is nearly as great as last year, being about 9,000,000 cubic yards, and that nearly 600 miles of canals and drains have been constructed.

Summary of construction results, June 30, 1918.

Items.	To June 30, 1918.		To June 30, 1917.		Increase.	
Lands:						
Estimated area of projects on completion	*Acres.* 3,081,480	*Farms.* 62,477	*Acres.* 3,072,795	*Farms.* 62,451	*Acres.* 8,685	*Farms.* 26
Reservoir capacity available (original)	*Acre-feet.* 9,197,460		*Acre-feet.* 9,193,800		*Acre-feet.* 3,660	
Canals, ditches, and drains:	*Miles.*		*Miles.*		*Miles.*	
Canals over 800 second-feet capacity	420		401		19	
Canals 301 to 800 second-feet capacity	667		665		2	
Canals 50 to 300 second-feet capacity	1,807		1,678		129	
Canals less than 50 second-feet capacity	7,544		7,226		318	
Total canals	10,438		9,970		468	
Waste-water ditches	495		456		39	
Drains, open	643		575		68	
Drains, closed	163		149		14	
Total	1,301		1,180		121	
Grand total	11,739		11,150		589	

Summary of construction results, June 30, 1918—Continued.

Items.	To June 30, 1918.		To June 30, 1917.		Increase.	
	Number.	*Length (feet).*	*Number.*	*Length (feet).*	*Number.*	*Length (feet).*
Tunnels	94	142,237	94	141,987	....	250
Storage and diversion dams:	*Cubic yards.*		*Cubic yards.*		*Cubic yards.*	
Masonry	2,084,187		2,083,376		811	
Earth	9,998,351		9,818,103		180,248	
Rockfill and crib	1,185,529		1,155,763		29,766	
Total	13,268,067		13,057,242		210,825	
	Length (feet).	*Cubic yards.*	*Length (feet).*	*Cubic yards.*	*Length (feet).*	*Cubic yards.*
Dikes and levees	504,426	4,470,702	499,180	4,430,190	5,246	40,512
Canal structures:	*Concrete.*	*Wood.*	*Concrete.*	*Wood.*	*Concrete.*	*Wood.*
Costing over $2,000	958	184	902	134	56	50
Costing $500 to $2,000	2,011	478	1,866	430	145	48
Costing $100 to $500	9,177	5,011	7,946	4,794	1,231	217
Costing less than $100	16,386	55,003	13,754	51,617	2,632	3,386
Total	28,532	60,676	24,468	56,975	4,064	3,701
Grand total	89,208		81,443		7,765	
Bridges:	*Number.*	*Length (feet).*	*Number.*	*Length (feet).*	*Number.*	*Length (feet).*
Steel	106	8,466	104	7,002	2	1,464
Combination	414	12,542	412	11,924	2	618
Wood	5,500	117,606	4,966	108,226	534	9,380
Concrete	342	4,254	335	4,174	7	80
Total	6,362	142,868	5,817	131,326	545	11,542
Culverts:						
Concrete	1,832	88,719	1,654	80,371	178	8,348
Metal	1,433	52,005	1,346	48,977	87	3,028
Terra cotta	1,096	50,947	920	44,339	176	6,608
Wood	3,164	72,213	3,068	69,346	96	2,867
Total	7,526	263,884	6,988	243,033	537	20,851
Pipe:	*Linear feet.*		*Linear feet.*		*Linear feet.*	
Concrete	596,250		556,918		39,332	
Metal	239,616		239,400		216	
Terra cotta (tile)	1,166,337		1,046,770		119,567	
Wood	471,236		331,380		139,856	
Flumes:	*Number.*	*Length (feet).*	*Number.*	*Length (feet).*	*Number.*	*Length (feet).*
Concrete	80	20,427	76	14,870	4	5,557
Metal	755	150,799	674	142,084	81	8,715
Wood	1,928	433,947	1,679	362,134	249	71,813
Total	2,763	605,173	2,429	519,088	334	86,085
	Concrete.	*Wood.*	*Concrete.*	*Wood.*	*Concrete.*	*Wood.*
Canals lined ... miles	307.30	4.10	296.90	4.10	10.4	....
Total	311.40		301.00		10.4	
Buildings:	*Number.*		*Number.*		*Number.*	
Offices	83		79		4	
Residences	590		566		24	
Power plants	26		26		..	
Pumping stations	69		67		2	
Barns, storehouses, etc	495		446		49	
Total	1,263		1,184		79	
	Number.	*Depth (feet).*	*Number.*	*Depth (feet).*	*Number.*	*Depth (feet).*
Wells	416	35,411	391	34,583	25	828
Communications:	*Miles.*		*Miles.*		*Miles.*	
Roads	955		902		53	
Railroads	83		83		..	
Telephones	2,934		2,822		112	
Transmission lines	450		442		8	

Summary of construction results, June 30, 1918—Continued.

Items.	To June 30, 1918.	To June 30, 1917.	Increase.
Power developed, water and steam	*Horsepower.* 48,093	*Horsepower.* 47,361	*Horsepower.* 732
Excavation:	*Cubic yards.*	*Cubic yards.*	*Cubic yards.*
Class 1, earth	141,015,518	133,043,727	7,971,791
Class 2, indurated material	9,569,457	8,882,812	686,645
Class 3, rock	8,199,793	7,859,995	339,798
Total	158,784,768	149,786,534	8,998,234
Riprap	1,735,893	1,527,920	207,973
Paving	*Square yards.* 807,485	*Square yards.* 749,395	*Square yards.* 58,090
Concrete	*Cubic yards.* 2,976,448	*Cubic yards.* 2,942,775	*Cubic yards.* 33,673
Cement	*Barrels.* 2,919,107	*Barrels.* 2,841,763	*Barrels.* 77,344

Repayments.—The projects now making payments under public notice are as follows:

Arizona, Salt River project.
Arizona-California, Yuma project.
California, Orland project.
Idaho:
    Boise project.
    Minidoka project.
Montana, Huntley project.
Nebraska-Wyoming, North Platte project.
Nevada, Truckee-Carson project.
New Mexico, Carlsbad project.
Oregon, Umatilla project.
Oregon-California, Klamath project.
South Dakota, Belle Fource project.
Utah, Strawberry Valley project.
Washington:
    Okanogan project.
    Yakima project.
Wyoming, Shoshone project.

Repayments of construction charges are increasing gradually and for the fiscal year 1918 reached the sum of $1,353,144.64.

Operation and maintenance.—The Reclamation Service has operated all of the projects under its charge except the Salt River project and the gravity unit of the Minidoka project, which, as above stated, have been turned over to the water users for operation and maintenance. Considerable progress has been made in the matter of cooperation with the water users, and friendly cooperative relations now obtain where antagonism formerly existed on several of the projects. Benefit has been derived by the irrigators from the dissemination of knowledge of better methods of farming and irrigation, and in spite of unfavorable physical conditions the projects as a whole are prosperous and remunerative and are contributing largely to the wealth and especially to the subsistence of the country. The crop values on Government projects for the season of 1917 reached nearly $60,000,000, without taking account of the live-stock industries, including meat, dairy products, wool, etc. It is probable that if these could be ascertained it would bring the total to over $70,000,000. Besides this, is the indirect or incidental benefit to the mining and live-stock industries resulting from the production of large quantities of food and forage in the localities where needed and the increase in the number of independent homes in the arid region.

It is necessary for the Reclamation Service to exert by such methods as may be possible a pressure toward the achievement of greater economy in the use of water than has obtained in the past. A few of the projects have achieved creditable results in this respect, while upon others much remains to be done to terminate wasteful use of water and correct the injury that this has produced.

An excess of water used in irrigation is not only a waste of a costly and precious liquid which should be used in extending agricultural production, but it is actually harmful to the lands to which applied by leaching plant food from the soil, raising the water table, and causing injurious swamp or water-logged conditions in their vicinity.

The methods employed to enforce and encourage a more rational use of water are three:

1. Dissemination of knowledge of the reasons why excess of irrigation water is injurious, and the methods adapted to conserve water in the soil and to handle it with greater economy.
2. Adjustment of charges for irrigation water as required by the reclamation extension act, by which the irrigator must pay for the use of excessive quantities of water.
3. The introduction of the rotation system by which water is delivered in larger heads in order that it may be more economically used, and careful measurement of water to each user.

Settlement.—The settlement section under the jurisdiction of the statistician has charge of publicity, photography, and the dissemination of information concerning the home-making opportunities of the service. Publicity is obtained through the medium of the daily and weekly press, special stories for syndicate and magazine writers and others, lectures illustrated by stereopticon and motion pictures, the loaning of illustrated lectures, and by attractive exhibits at fairs, expositions, etc.

During the fiscal year the use of the newspapers and magazines decreased for the reason that the work of construction having been gradually slowed up, the area of public lands available for settlers correspondingly was reduced. War has resulted in fewer calls for lectures and material for special stories. Notwithstanding these facts there has been but slight falling off in the number of inquiries for homeseekers, and the correspondence in the Washington office continued heavy throughout the year.

During the fiscal year the settlement section had charge of three important land openings, namely, on the Shoshone project, September, 1917; on the Grand Valley project, March, 1918; and on the Uncompahgre project, April, 1918. Announcement of these openings brought a flood of inquiries to the Chicago and Washington offices. In a single day more than 1,200 people visited the former office. During a period of three days the temporary office in Kansas City was visited by more than 500 homeseekers daily. The lands opened to entry were unclassified, and on each project varied widely in quality and value. Naturally the homeseekers made choice of the best, and there was no difference in the water-right charges. This resulted in as high as 50 to 60 applications for the choicest units, while numerous of the poorer and less attractive units were without an applicant. At each opening the number of homeseekers in attendance greatly exceeded the total number of the farms, and if the latter had been of equal value all would have been filed on. The injustice of taxing the poorest land on a project the same construction charge that is placed on the best will always retard the settlement of the former. The proof of this is found in the fact that of the 295 farm units open to entry to-day on all of the projects not one can be classed as choice. Most of the remaining units are rough, seeped, and cut by canals or otherwise unattractive and far more expensive to develop. For one or more of the reasons mentioned these units are vacant to-day, and in numerous cases are an eyesore or a breeding place for grasshoppers and rabbits. On projects like the Minidoka and North Platte such units are gradually being acquired by sons or relatives of farmers residing nearby or by employees of the Government. On the Minidoka project a large number of units of this kind were taken up during the past 12 months. To-day less than 200 acres remain unentered on this project.

In view of the extraordinary favor which the public and our national lawmakers have accorded the plans of the Secretary to provide employment and homes on reclaimed areas for our returning soldiers, it is well to emphasize the fact that notwithstanding the war crisis there is no lessening in the demand for public lands as soon as they are made available, by homeseekers who are not at the front. Some provision must be made to satisfy this demand at the same time that the Nation is providing for its soldiers. The follow-up system employed by the settlement section to ascertain the financial condition and experience of the homeseekers indicates that a far better class is to-day seeking lands under Government control than ever before. They are more practical and experienced, and as a rule have a greater capital to invest, all of which presages a larger measure of success. With the jump in prices of all farm products, lands on the projects generally have greatly increased in value. It is no longer surprising to find lands but three years from desert selling for $100 and $200 per acre, the buyer in addition having to pay a water-right charge ranging from $40 to $80 per acre.

Briefly summing up the settlement work it may be said that the demand for Government lands of good quality far exceeds the supply, and the present settlement organization with little difficulty could readily find settlers for 200,000 acres a year. The untilled lands on the projects offering the greatest difficulty in the way of settlement are those in private ownership. The problem of securing homeseekers for these can not be solved successfully until the present owners prepare these lands for crops and make the prices and terms of sale more attractive. Exploitation of the settler, while much less prevalent than before, still obtains on some of the projects, and it is a serious factor in retarding development. With the high prices of farm crops the percentage of tenant farmers shows an increase. Many of our landowners have leased their lands and have moved into town. This condition warrants careful consideration of all who are concerned in perpetuating the back-to-the-land movement because it subverts the basic principle upon which the reclamation act was founded. The evils of tenantry are too well understood to require discussion.

During the past year the settlement section has had the heartiest cooperation of the project and civic associations, of the State land boards, and other officials. This cooperation has enabled the service to secure a very large quantity of valuable motion film, photographs, and other publicity material. Much of this film has been made available for public use, and a large amount is now being used by the committee on public information in connection with its educational campaign abroad.

In June the settlement office was closed for the term of the war.

Irrigation and crop results, 1917.—The works built under the reclamation law are now serving probably 2,000,000 acres under irrigation. The exact acreage is not known to the Reclamation Service because considerable areas not covered by its census are under canals built by private parties and are related to the Government projects only through contracts under the Warren Act, by which they share in various degrees the benefits of the Government works. In most of these cases the storage works are used in common; occasionally the diversion works and main carriage canals and part of the water stored or diverted by the Government is delivered in bulk to the private canals or irrigation districts, which provide their own distributaries and operate them.

On most of the reclamation projects proper, where the Reclamation Service has built and operates the complete system of storage and distribution works, carrying water to each farm, the service has a force of ditch riders in daily touch with the irrigators. As the delivery of water declines toward the close of the season this organization, while still required for occasional deliveries, can perform other service and an opportunity is offered at little extra expense to collect data of the exact areas irrigated and the crops produced. Such statistics have been collected for a number of years. Although, as indicated above, these figures do not show the entire development or crop production based on the works built under the reclamation law, they do show a large part of it and are complete enough to show clearly the nature of the crops grown, their relative importance in area, the values produced, and other factors.

This crop census for 1917 shows that in the present world crisis the reclamation projects are making a substantial contribution to the food supply. Seven million bushels of grain, an equal quantity of vegetables and truck, and 200,000,000 pounds of fruit were harvested from the lands covered by the census. A million and a half tons of hay and forage crops were produced and largely converted to animal products by feeding on the projects. Other crops included nearly 12,000,000 pounds of cotton, 30,000,000 pounds of cotton seed, and 300,000 tons of sugar beets, which yielded probably 75,000,000 pounds of sugar. The total crop reported was worth $57,000,000, substantially more than that reported for any New England State at the last national census. Thus in effect a new State has been added to the Nation in the matter of crop production, farm homes, and agricultural development. It is conservative to say that the crop and live-stock products on lands irrigated from the Government works, in value and nearly in variety, are sufficient to clothe and feed an army of a quarter of a million men.

Summary of 1917 crop reports, by crops.

Crop.	Acreage cropped.		Yields.			Crop value.		
	Total.	Per cent.	Units.	Total.	Average per acre.	Average per acre.	Total.	Per cent
Cereals:								
Barley	34,809	3.6	Bushel	916,060	26	$33	$1,151,960	2.0
Corn	33,146	3.4	...do	932,051	28	39	1,291,313	2.3
Oats	50,546	5.2	...do	1,343,956	27	21	1,079,045	1.9
Rye	1,742	.2	...do	16,031	9	15	25,554	.1
Wheat	114,814	11.9	...do	2,318,783	20	38	4,416,391	7.7
Total	235,057	24.3	...do	5,526,881	24	34	7,964,263	14.0
Other grain and seed:								
Alfalfa seed	8,730	.9	...do	38,903	4.5	43	373,078	.7
Clover seed	8,112	.8	...do	32,267	4	53	426,880	.7
Grain sorghum	36,985	3.9	...do	1,396,049	38	46	1,703,434	3.0
Flax seed	2,764	.3	...do	11,783	4.3	12	33,586	.1
Millet seed	341	....	...do	3,147	9	14	4,840	......
Total	56,930	5.9	...do	1,482,149	....	45	2,541,818	4.5

Summary of 1917 crop reports, by crops—Continued.

Crop.	Acreage cropped.		Yields.			Crop value.		
	Total.	Per cent.	Unit.	Total.	Average per acre.	Average per acre.	Total.	Per cent.
Hay and forage:								
Alfalfa hay	389,477	40.3	Ton	1,254,782	3.2	$52	$20,440,653	35.9
Clover hay	10,403	1.1	...do	21,950	2.1	32	328,827	.6
Other hay	23,110	2.4	...do	22,523	1.0	18	427,772	.7
Corn fodder	8,726	.9	...do	31,547	3.6	42	365,045	.6
Peas	655	.1	Bushel	7,234	11	35	22,972	......
Other forage	2,985	.3	Ton	30,883	10	101	302,033	.5
Pasture	121,308	12.5	....	....	....	[1] 15	1,832,178	3.2
Total	556,664	57.6	....	....	....	43	23,719,480	41.5
Vegetables and truck:								
Beans	14,856	1.5	Bushel	193,590	13	66	981,637	1.7
Onions	886	.1	...do	187,157	211	256	226,504	.4
Potatoes, white	29,181	3.0	...do	6,015,383	206	164	4,772,760	8.4
Potatoes, sweet	419	....	...do	22,343	53	75	31,409	.1
Truck	13,951	1.5	....	....	....	107	1,504,463	2.6
Total	59,293	6.1	....	....	....	127	7,516,773	13.2
Fruits and nuts:								
Apples	28,014	2.9	Pound	157,059,460	5,600	113	3,164,764	5.6
Peaches	2,762	.3	...do	15,700,574	5,700	128	353,161	.6
Pears	3,204	.3	...do	15,711,457	4,900	160	515,203	.9
Prunes	575	.1	...do	4,233,425	7,400	252	144,792	.3
Citrus fruit	1,088	.1	...do	6,641,600	6,100	252	274,887	.5
Small fruit	1,187	.1	...do	5,231,640	4,400	157	186,125	.3
Other fruit and nuts	908	.1	...do	2,771,760	3,050	87	78,770	.1
Total	37,738	3.9	...do	207,349,916	5,500	125	4,717,702	8.3
Miscellaneous:								
Sugar beets	32,924	3.4	Ton	318,471	9.7	69	2,275,338	4.0
Cotton	40,166	4.2	Pound	11,869,441	295	162	6,502,625	11.4
Cotton seed	....	....	...do	30,002,480	750	22	888,758	1.6
Cane	522	....	Ton	1,177	2.3	41	21,191	......
Other crops	5,843	0.6	....	....	....	143	839,965	1.5
Total	79,455	8.2	....	....	....	182	10,527,877	18.5
Duplication	58,355	6.0	....	....	....	....	....	......
All crops	966,784	100.0	....	....	....	59	56,987,913	100.0

[1] This figure does not represent average value of pasture for a year or season, as considerable areas pastured were also harvested and are included in the duplicated area.

The project statistics for 1917 covered an area of approximately 1,500,000 acres irrigable—that is, for which the service was prepared to supply water. Of this slightly over 1,000,000 acres, or two-thirds, were actually watered. This does not indicate a failure to utilize a half million acres and the water ready for it. A part of this balance under the most easterly projects is cultivated or pastured without irrigation. A part is public land which, though under ditch, is withheld from entry for a seasoning of the canals or other action preliminary to inviting in settlers. A small part is public land awaiting entry. Other tracts are State, railroad, or Indian land, more or less in process of subdivision and transfer to settlers.

But the largest part of this unirrigated land for which water is ready comprises a great number of small pieces of the irrigated farms. The figure given as irrigable agrees with the official farm unit plats and is the total irrigable area on which water charges are based, but necessarily a part of this is taken up by the farmers' ditches, buildings, roads, and canals, so that it can not be cultivated. On this account the most complete use of the irrigable area to be ultimately expected will show the irrigation of from 80 to 90 per cent. Also the new settler of ordinary means can not put his whole unit to use the first year, nor the second, but gradually adds to the area leveled, cultivated, and irrigated. For this reason the irrigated area lags behind the irrigable, both increasing each year as new farms are brought under the extended canal systems, and the older ones progress toward complete cultivation.

Of the 1,000,000 acres irrigated nearly 967,000 were harvested or pastured, the balance being devoted to young orchards not yet bearing, fall-planted alfalfa not cut until the following year, and similar items. Alfalfa continues to dominate the crop statistics, accounting for well over one-third the total area and value. As compared to the census of the preceding year all of the principal crops show substantial increase in both these respects, but relatively, that is in per cent of the total crop area and value, alfalfa shows a decrease of a few per cent. The same is true of other hays and forage, while increases are shown for vegetables and cotton, which registers the largest proportionate gain. Under the stimulus of high prices the cotton area was increased three-fold in 1917 and this will probably be doubled in 1918. Cotton is grown on three southern projects. The most notable development of this industry is in the Salt River Valley of Arizona, where a superior product of long staple has been developed, bringing a price as high as 75 cents per pound.

Other high prices were enjoyed by the farmers on the Government projects, with resulting high returns. The average return for cotton was $180 per acre, for fruits $125, for sugar beets $69, for vegetable and truck crops $127. It must be remembered that war prices leading to these results are accompanied by labor shortage and higher production costs. The cereals, which entail the lowest production cost, returned an average of $34 per acre. For alfalfa this figure was $52, and the total value reported for all crops represents an average gross return of $59 per acre.

It should be noted that these figures are averages for all the Government projects, which are widely distributed throughout the West. Similarly the reports for each project give total and average figures for yields and values, with no effort to segregate either the more successful, which would show far greater returns than the average, or the failures, if any. Even if a crop failed entirely the field is included in the acreage figures used to determine average results. In other words, the crop reports are a complete crop census of certain large irrigated tracts, including old and new farms, the highest yields and the lowest, the best soils and the poorest, the most successful and the least successful farmers.

Such figures do not begin to show the limit that can be attained, but do provide Congress and others interested in the reclamation of arid lands some index of the present accomplishment of the project settlers. The project census does not include any income from farm animals, but it is known that substantial additional returns are realized from sales of animals, poultry, dairy products, wool, and honey.

In the accompanying tables the crop reports are summarized by projects and by crops.

Summary of 1917 crop reports, by projects.[1]

State and project.	Irrigable acreage.[2]	Irrigated acreage.	Cropped acreage.[3]	Crop value.	
				Total.	Per acre.
Arizona, Salt River	[4] 212,960	[5] 201,600	188,500	$13,692,000	$72.64
Arizona-California, Yuma	65,000	36,956	35,578	3,752,669	105.47
California, Orland	20,480	12,729	9,608	543,570	56.57
Colorado:					
Grand Valley	35,000	5,289	4,523	198,960	44.00
Uncompahgre [6]	85,000	53,108	52,717	3,051,668	57.89
Idaho:					
Boise	[7] 223,000				
Covered by census	143,780	96,524	88,732	4,386,545	49.44
Minidoka	120,850	99,020	92,456	5,119,048	55.15
Montana:					
Huntley	31,892	19,122	19,105	690,830	36.16
Milk River [8]	45,000	11,058	10,893	206,335	19.12
Sun River [9]	16,224	6,675	7,445	219,130	29.43
Montana-North Dakota, Lower Yellowstone [10]	42,232	15,744	15,659	459,557	29.35
Nebraska-Wyoming:					
North Platte	[11] 129,778	[11] 92,553			
Covered by census	111,941	83,203	80,760	3,385,060	41.92
Nevada, Truckee-Carson	70,915	40,392	39,236	1,450,480	[12] 37.00
New Mexico, Carlsbad	24,775	16,882	15,729	623,818	39.66
New Mexico-Texas, Rio Grande	88,000	64,308	63,626	3,598,424	56.56
Oregon, Umatilla	26,300	7,335	5,546	311,396	56.15
Oregon-California, Klamath	44,715	33,635	32,929	847,200	25.73
South Dakota, Belle Fourche	83,335	50,272	50,026	1,171,239	23.41
Utah, Strawberry Valley	50,000				
Covered by census		27,147	25,620	1,290,746	50.37
Washington:					
Okanogan	10,099	8,000	6,314	616,640	96.88
Yakima:					
Sunnyside unit	97,285	80,500	65,803	8,006,230	121.67
Tieton unit	33,422	25,400	24,425	2,303,196	94.30
Wyoming, Shoshone	43,263	32,764	31,554	1,061,180	33.63
Total	1,599,525				
Covered by census	1,502,468	1,026,663	966,784	56,987,913	58.95

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[1] Excluding outlying areas (private canals) to which water is furnished under the Warren Act. Data are for calendar year (irrigation season) except on Salt River project data are for corresponding "agricultural year," October, 1916, to November, 1917.

[2] Area Reclamation Service was prepared to supply water.

[3] Irrigated crops. Excludes small areas on few projects cropped by dry farming.

[4] Includes so-called "dry lands" given right to rent water temporarily on account of ample storage.

[5] Includes about 5,000 acres within town sites, 3,000 acres reported "vacant" and probably largely pastured.

[6] Exclusive of relatively small area under private canals supplied Gunnison water.

[7] Includes New York Canal, Nampa-Meridian, and Pioneer district lands served project water.

[8] Crop reports covered an additional area of 8,780 acres cropped by dry farming, producing crops worth $47,548, or $5.42 acre.

[9] Above figures are for 176 irrigated farms, which included small tracts farmed without irrigation. In addition, crop reports covered 17 farms operated without irrigation, on which 567 acres yielded crops worth $7,322, or $12.91 per acre.

[10] Crop reports covered an additional area of 8,739 acres dry-farmed, producing crops worth $90,550 or, $10.36 per acre.

[11] Includes North Platte Canal & Colonization Co. lands.

[12] Fifty-one dollars and thirty-six cents, excluding 10,100 acres of wild-grass pasture and 3,081 acres otherwise not in full production.

General condition of settlers.—The social and financial condition of settlers has on the whole been generally and rapidly improving. This is due to the growth of experience on the part of the settler, the high prices secured for most of his products, and the very liberal terms of repayment fixed by the United States in the reclamation extension act. Except in a few cases of individual misfortune, settlers are finding it practicable to repay the charges assessed by the Government and to rapidly increase improvements on the farms; and wherever serious effort has been made these results have followed, except on the one project previously described where the water supply has been short. This rapid improvement in their material condition has operated with great power to produce a growing feeling of optimism and contentment on the part of the settlers.

Employees in military or naval service.—Seven hundred and seventy-nine employees of the service have joined the colors. Each project flies a service flag, and the Washington office a flag with a large central star containing the figures 779 and 25 small stars representing the employees from the Washington office alone who have enlisted. The flag also contains one gold star, in honor of Eugene Snyder, of the storage unit of the Yakima project, who was lost when the *Tuscania* was torpedoed by a German submarine. Mr. Snyder was the first employee of the Interior Department to lose his life in the war.

BUREAU OF MINES.

Scope of the work of the Bureau of Mines.—The work of the Bureau of Mines deals primarily with scientific and technical investigations relating to the mineral industries, including the safety and health of workers, the prevention of waste, and the increase of efficiency in the utilization of mineral resources. In its efforts to make its investigations of the widest practicable value, the bureau seeks the cooperation of all State and industrial organizations, and of all private individuals interested in the same problems.

Cooperative agreements.—In order to bring about more effective cooperation among the various agencies seeking to increase safety and efficiency in the mineral industries, the Bureau of Mines with the approval of the Secretary of the Interior has made cooperative agreements with various State establishments and with various universities.

During the fiscal year ending June 30, 1918, investigations were conducted under agreements with the following universities, schools, and organizations: Arizona State Mining Bureau, University of Arizona, California Industrial Accident Commission, University of California, Colorado State School of Mines, University of Idaho, Engineering Experiment Station of the University of Illinois, University of Minnesota, Cornell University, State School of Mines of the University of North Dakota, Ohio State University, Oregon Bureau of Mines and Geology, University of Utah, and the University of Washington.

Mine experiment and mine safety stations.—During the year the Secretary of the Interior under the authority given by Congress (40 Stat., 969) established three new mining experiment stations, these being at Minneapolis, Minn., Columbus, Ohio, and Bartlesville, Okla., under the direction of the Bureau of Mines. At the end of the year the bureau had 11 mining experiment stations, 8 mine safety cars, and 6 mine safety stations.

In addition to the new stations named, the bureau has mining experiment stations at Pittsburgh, Pa.; Urbana, Ill.; Salt Lake City, Utah; Golden, Colo.; Tucson, Ariz.; Berkeley, Cal.; Seattle, Wash.; and Fairbanks, Alaska. These mining experiment stations are investigating mining and metallurgical problems; the mine safety stations are instructing miners in first-aid and rescue methods, and in giving assistance after mine disasters.

War work.—Work on problems relating to the conduct of the war and the assuring of victory received chief attention during the year. In this work the bureau cooperated with the War Department, Navy Department, Department of Agriculture, United States Fuel Administration, National Research Council, United States Shipping Board, Capital Issues Committee, Council of National Defense, War Industries Board, Bureau of Standards, and with other bureaus of the Interior Department.

By far the most important work done in cooperation with the War and Navy Departments was that involved in the organization and development of a great experiment station at the American University, Washington, D. C., for devising and testing poisonous gases, toxic and nontoxic smokes; also gas masks, incendiary bombs, flaming liquids, signal lights, and other war material. This work had started in the previous year with the development of gas masks and the beginning of investigations of poison gas.

A committee on gases used in warfare was formed by the National Research Council to cooperate with the Bureau of Mines, Van. H. Manning, director of the bureau, being made chairman of this committee.

Later, an advisory board to the director of the bureau was appointed by the Secretary of the Interior, this board being composed of leading men of science.

The development of work on a large scale at the American University began in the fall of 1917, the buildings and grounds being occupied under a lease for the duration of the war. Some of the immediate results of this work were the establishment in the National

Army of the Chemical Corps, composed largely of men trained by the Bureau of Mines, and the organization of a staff of chemical engineers, developing processes of manufacturing gases, which was transferred to the Bureau of Ordnance of the War Department. Another organization which had its inception under the bureau was the proving-ground unit of the War Department, for testing poison gases on an artillery scale. Among the devices investigated and tested at the American University experiment station were aeroplane bombs, smoke screens, gas shells and bombs, incendiary shells, trench projectors, and flame throwers. The manufacture of gas masks was transferred early in the past fiscal year to the Surgeon General's Office of the Army.

On June 25, 1918, all the work being done at the American University was transferred by order of the President from the Bureau of Mines to the Chemical Warfare Service of the Army. On the date of the transfer 1,682 men were engaged in investigations, of whom 841 were military and 841 were civilian appointees. The disbursements for the fiscal year from the total allotment of $2,462,000 ($2,212,000 from the War Department and $252,000 from the Navy Department) amounted to $2,457,372.91.

In addition to the war-gas investigations, the Bureau of Mines, under an allotment of funds from the Ordnance Department of the Army, designed and supervised the construction of a large plant at Saltville, Va., for the manufacture of an important compound used in gas warfare.

The bureau also investigated, in cooperation with the War and Navy Departments, the production from natural gas of gases for use in balloons, and assisted in the erection of a plant in Texas for the production of these gases.

Other cooperative work with the War Department included the improvement and the manufacture on a commercial scale of the Gibbs breathing apparatus for use in poisonous and irrespirable gases.

Work on the production of nitrates and the oxidization of ammonia to nitric acid, which was begun in the previous year, led to the development of a process for oxidizing ammonia that is more efficient than any in use and has been adopted by the War Department for use at some of its nitrate plants.

War minerals investigation.—Because of the shortage of shipping and the consequent need of utilizing domestic resources of certain minerals and metals, such as manganese, potash, chrome, mica and tin, that had formerly been imported and were urgently needed for war purposes, the bureau gave much attention to study of problems concerning these war minerals.

Under an appropriation by Congress of $150,000 for war materials investigation this work was organized on a large scale. The organization at the end of the year comprised about 100 persons of whom about 90 were mining engineers, metallurgists or chemists.

The investigations in progress include the utilization of domestic manganese ores and low-grade manganese alloys; a review of the chrome resources of the country; determination of the available supply of sulphur and pyrite needed for manufacturing sulphuric acid; and methods of increasing the supply of potash.

Explosives regulation.—Under the act regulating the manufacture, distribution, storage, use, or possession of explosives and their ingredients during the war (Public 68, H. R. 3932), approved October 6, 1916, the Bureau of Mines is given wide authority.

In accordance with the provisions of the act, the bureau appointed some 14,000 carefully selected licensing agents throughout the United States and its insular possessions, and an explosives inspector was appointed in each State by the President. In enforcing this act, the Bureau of Mines has had the cooperation of all Federal, State, and municipal authorities and agents, and has endeavored to have mine owners and operators supply workmen with explosives in such a manner as will guard against misuse or accident. More than 900 instances of the violation of the act are being investigated, and more than 30 convictions have been secured. Careful study of the nature and causes of explosions in plants manufacturing high explosives has enabled the bureau to offer helpful suggestions to manufacturers. These suggestions, when carried out, should largely obviate the possibility of the recurrence of similar disasters.

Administrative divisions.—For purposes of administration the technical and scientific work done by the bureau at its Washington office and at its various mining experiment stations is grouped in four divisions as follows: Mining, which includes investigations relating to safety and efficiency in mining and quarrying practice and the instruction of miners in first and safety methods; fuels and mechanical equipment, which embraces the analyzing and testing of fuels and the investigation of mine safety devices; metallurgy, which deals especially with the improvement of the methods of treating low-grade ores and of eliminating waste; mineral technology, which comprises investigations of various mineral or mineral products in order to ascertain how they can be obtained more abundantly, cheaply, or of better quality; and petroleum technology, which deals with the reduction of waste of petroleum and natural gas in the development of oil and gas fields and the increase of efficiency in transporting. refining, and utilizing petroleum and petroleum products. Each of these divisions is under a chief who reports to the director. The work on war minerals, organized as the war minerals investigation, is also under a chief who reports to the director. The work being done in the investigation of mining explosives, and the enforcement of the act to regulate the manufacture, sale, and possession of explosives during the war was organized as the explosives division on July 1, 1918.

Rescue and first-aid work.—The mine rescue, or mine safety, stations of the bureau are situated at Pittsburgh, Pa.; Norton, Va.; Jellico, Tenn.; Birmingham, Ala.; McAlester, Okla.; and Seattle, Wash. The mine safety cars have headquarters at Pittsburgh, Pa.; Huntington, W. Va.; Ironwood, Mich.; Evansville, Ind.; Pittsburg, Kans.; Butte, Mont.; Raton, N. Mex.; and Reno, Nev. The bureau also maintains three motor rescue trucks—one at Pittsburgh, Pa., one at Birmingham, Ala., and one at Seattle, Wash. Through the cars and stations the bureau renders aid at mine disasters and trains miners in first aid methods and the use of rescue equipment. About 55,000 miners have been trained since the beginning of this work by the Government. During the past fiscal year 30 accidents at coal mines and 8 at metal mines were investigated by the engineers attached to these cars and stations.

Mine explosions and fires.—Dusts from different coal mines were tested to determine their explosibility, the effects of various factors in originating mine explosions, and the methods of applying rock dusts to check or prevent explosions. Various explosives were tested to determine their permissibility for use in gaseous or dusty coal mines; 9 of these were approved, and the permissible list at the end of the year contained the names of 160 explosives. Nearly 35,000,000 pounds of these explosives were used in the calendar year 1917, as compared with 2,000,000 pounds of similar explosives in 1908, the year in which the testing of mine explosives by the Government began.

Especial attention was given to the improvement of breathing apparatus for use by men entering poisonous and irrespirable gases, and in cooperation with the War Department the Gibbs apparatus, an improvement on all preceding types, was perfected for commercial manufacture, 600 sets of the apparatus being made during the year.

Sanitary conditions at mines.—A surgeon of the United States Public Health Service is assigned to each of the new mine safety cars of the bureau. In the course of the trips through the mining districts of the country, each surgeon not only examines miners as to their fitness for mine rescue work and gives public lectures on matters relating to first aid, sanitation, and hygiene, but also makes sanitary inspections at the different mines and mining communities and suggests to owners or operators improvement of conditions such as will lessen the risk of preventable or occupational diseases. These sanitary inspections were made at 150 mines, smelters, and mining communities in the past fiscal year. The suggestions offered were gladly received by practically all the operators or owners.

Fuel investigations.—Work at the Pittsburgh station and elsewhere on methods of burning fuel with greater efficiency was largely restricted to cooperation with the United States Fuel Administration for the purpose of impressing the public with the necessity of saving fuel and explaining the means and methods of effecting this saving. Studies of the combustion of fuel in boiler furnaces and the baffling of boilers were made in connection with boiler tests for the emergency fleet. Heat transmission tests at the Pittsburgh experiment station were terminated or were suspended on account of the equipping of the new power plant and the dismantling of the old equipment.

Analyzing and testing of mine and car samples of coal intended for Government use continued through the year. The number of samples analyzed varied greatly at different times because the specification basis—that of heat units, content of moisture, and ash—for the purchase of coal for the Government was temporarily set aside when the Fuel Administration named mine prices for coal throughout the country. Many coal mines were examined and sampled on behalf of the Navy Department and the Fuel Administration.

As a result of recommendations made by the Bureau of Mines, Congress authorized the establishment of a large Government coal yard in the District of Columbia from whence all Federal and municipal buildings will be supplied. Through the establishment of this yard, which will be under the direction of the bureau, large economies should be effected in the purchase and use of the coal needed in the District by the Government.

Investigations of mineral technology.—In its investigations relating to various minerals, rare metals, alloys, and building materials, the bureau conducted work on radium and radioactive substances, on the ores of manganese, tungsten, molybdenum, nickel, on the perfecting of an electric furnace for melting brass, and on the study of labor-saving methods at limestone and cement-rock quarries.

In the work on radioactive substances especial attention was given to the finding and preparation of substitutes for radium for use in luminous paint, because of the supply of radium being small and the radium used in luminous paint being dissipated. One of these radioactive substances suitable is meaothorium which the bureau has shown can be recovered as a by-product in the manufacture of substances used for making incandescent mantels for gas lights. Tests on a commercial scale showed the practicability and efficiency of the electric brass melting furnace that has been under development for several years, and this furnace, which will lessen the large loss of zinc that happens when brass is melted in crucibles over coke fired furnaces, is now in commercial use at several foundries. The study of labor-saving devices at limestone quarries has shown how quarry operators can best meet the present shortage of labor.

Petroleum technology investigations.—In the work being done to increase efficiency in the production, distribution and utilization of natural gas, petroleum and petroleum products, is included the investigation of problems in production technology, engineering technology, and chemical technology.

The Bureau of Mines has cooperated with the Indian Office for the prevention of waste of oil and gas on Indian lands in Oklahoma, the United States Fuel Administration, and the War and Navy Departments in efforts to increase the efficiency of the Nation's fuel supply.

Production technology.—The work on production technology includes the use of cement to shut off infiltrating water from oil wells; the determination of the ultimate production of oil lands as shown by decline curves of nearly all the important oil fields of the country; the occurrence and relation of gas, oil, and water in different fields; and the preparation of statistics showing the output of the refineries throughout the country.

Engineering technology.—Engineering technology problems including those of oil storage in tanks and reservoirs; the prevention of gas and oil well fires; the sanitation of oil camps and pumping stations; the investigation of refinery practice with especial reference to thermal efficiency and heat recovery; the recovery of gasoline from natural gas; and the use of gas traps to prevent waste of gas at oil wells.

Chemical technology.—Chemical technology work covers the routine examination of samples of fuel oil and gasoline purchase for the Government, the investigation of fuels for aeroplane and truck motors, and the study of cracking processes for making gasoline, and the investigation of the possibility of obtaining gasoline from the oil shales of the West.

Among the important developments of the year are the work done in demonstrating to operators in the Mid-Continent field the possibilities of protecting oil sands from invading water by the use of cement, the progress of the work on refinery economics, and the finding of fuels that promise to render possible a notable increase in the power output of aeroplane engines.

Metallurgical investigations.—Metallurgical work conducted by the Bureau of Mines at its various experiment stations includes the treatment of low-grade and complex ores of lead, zinc, and copper, the beneficiation and smelting of manganese ores, the leaching of copper, silver, and gold ores, and the preparation of manganese alloys. A brine-leaching process has been devised that promises to be of material value in handling oxidized ores of lead with or without silver; also a chloride volatilization process—roasting with common salt and precipitating the chloride fumes by electricity—for treating both oxidized and sulphide ores of lead, has yielded results that indicate it has immediate commercial possibilities.

In the treatment of zinc ores the roasting and leaching of low-grade sulphide ores has been made practicable by the development of a cheap and simple method of precipitating zinc from sulphate solutions. Because of the increased need of manganese in steelmaking consequent on the immense demand for steel, special attention has been given to the possibility of procuring in this country a sufficient quantity of low-grade manganese ore and the possibility of using low-grade manganese alloys made from these ores in place of the high-grade ores and alloys that were formerly imported. A survey of the manganese resources of the country has shown that enough manganese ore can be obtained, and the problem of supplying steel makers with manganese becomes one of utilizing low-grade ores and alloys. Much data has been gathered on the smelting of manganese ores in blast furnaces, and on the possibilities of electric smelting. A leaching process for the treatment of manganiferous silver ores is now under investigation, which yields manganese as a by-product.

In the metallurgy of copper ores decided progress has been made in the use of chloride volatilization for low-grade ores, also a hydrometallurgical process for recovering copper from low-grade ores by a solution of SO_2 gas has been worked out and is now being thoroughly tested on a large scale by mining companies.

Other problems that were studied during the year included the metallurgy of quicksilver, with especial reference to losses of quicksilver in the furnace gases; the metallurgical treatment of ores or nickel, molybdenum, and tungsten; and the flotation process of separating valuable minerals as applied to ores of copper, lead, and zinc.

Chemical research.—The chemical laboratories of the Bureau of Mines analyzes samples of coal from mines throughout the United States, samples of coal purchased for Government use, also samples of coal dust and road dust collected in mines after explosions or in the course of mine examinations; samples of coal, ash clinker, and fuel from fuel tests and samples of mine air and natural gas. Two researches that yielded successful results during the year were the devising of a method for determination of all the components of gas mixtures used in warfare, and the devising of a method by which engineers in the field can readily detect small quantities of SO_2 in mine air.

NATIONAL PARK SERVICE.

The developments of the year and a half which have elapsed since the national parks were organized under the law creating the National Park Service have proved the adequacy of the means for the objects to be accomplished. Notwithstanding the fact that this period was wholly a war period, both the national parks system and the individual parks have moved forward with a vigor and sureness previously unknown. Handicapped by an insufficient staff in Washington, by the loss of many employees in the field to the Army and Navy, and by the great scarcity of labor for work in the parks, nevertheless, as compared with the years preceding the establishment of the National Park Service, the increase in efficiency and progress, particularly during the year just passed, is marked.

As is shown by figures given later, the parks did their bit toward the national cause of war by furnishing important means of recuperation and recreation. With the coming of peace, they will, of course, enter upon a period of great public usefulness.

The national park policy.—Following the organization of the National Park Service a formal definition of the administrative policy became necessary to guide its activities. This was formulated in a letter to the Director of the National Park Service, under date of May 13, 1918, the text of which follows:

DEPARTMENT OF THE INTERIOR,
Washington, May 13, 1918.

MR. STEPHEN T. MATHER,
Director National Park Service.

DEAR MR. MATHER: The National Park Service has been established as a bureau of this department just one year. During this period our efforts have been chiefly directed toward the building of an effective organization while engaged in the performance of duties relating to the administration, protection, and improvement of the national parks and monuments, as required by law. This constructive work is now completed. The new Service is fully organized; is personnel has been carefully chosen; it has been conveniently and comfortably situated in the new Interior Department Building; and it has been splendidly equipped for the quick and effective transaction of its business.

For the information of the public an outline of the administrative policy to which the new Service will adhere may now be announced. This policy is based on three broad principles: "First, that the national parks must be maintained in absolutely unimpaired form for the use of future generations as well as those of our own time; second, that they are set apart for the use, observation, health, and pleasure of the people; and third, that the national interest must dictate all decisions affecting public or private enterprise in the parks."

Every activity of the Service is subordinate to the duties imposed upon it to faithfully preserve the parks for posterity in essentially their natural state. The commercial use of these reservations, except as specially authorized by law, or such as may be incidental to the accommodation and entertainment of visitors, will not be permitted under any circumstances.

In all of the national parks except Yellowstone you may permit the grazing of cattle in isolated regions not frequented by visitors, and where no injury to the natural features of the parks may result from such use. The grazing of sheep, however, must not be permitted in any national park.

In leasing lands for the operation of hotels, camps, transportation facilities, or other public service under strict Government control, concessioners should be confined to tracts no larger than absolutely necessary for the purposes of their business enterprises.

You should not permit the leasing of park lands for summer homes. It is conceivable, and even exceedingly probable, that within a few years under a policy of permitting the establishment of summer homes in national parks, these reservations might become so generally settled as to exclude the public from convenient access to their streams, lakes, and other natural features, and thus destroy the very basis upon which this national playground system is being constructed.

You should not permit the cutting of trees except where timber is needed in the construction of buildings or other improvements within the park and can be removed without injury to the forests or disfigurement of the landscape, where the thinning of forests or cutting of vistas will improve the scenic features of the parks, or where their destruction is necessary to eliminate insect infestations or diseases common to forests and shrubs.

In the construction of roads, trails, buildings, and other improvements, particular attention must be devoted always to the harmonizing of these improvements with the landscape. This is a most important item in our program of development and requires the employment of trained engineers who either possess a knowledge of landscape architecture or have a proper appreciation of the esthetic value of park lands. All improvements will be carried out in accordance with a preconceived plan developed with special reference to the preservation of the landscape, and comprehensive plans for future development of the national parks on an adequate scale will be prepared as funds are available for this purpose.

Wherever the Federal Government has exclusive jurisdiction over national parks it is clear that more effective measures for the protection of the parks can be taken. The Federal Government has exclusive jurisdiction over the national parks in the States of Arkansas, Oklahoma, Wyoming, Montana, Washington, and Oregon, and also in the Territories of Hawaii and Alaska. We should urge the cession of exclusive jurisdiction over the parks in the other States, and particularly in California and Colorado.

There are many private holdings in the national parks, and many of these seriously hamper the administration of these reservations. All of them should be eliminated as far as it is practicable to accomplish this purpose in the course of time, either through congressional appropriation or by acceptance of donations of these lands. Isolated tracts in important scenic areas should be given first consideration, of course, in the purchase of private property.

Every opportunity should be afforded the public, wherever possible, to enjoy the national parks in the manner that best satisfies the individual taste. Automobiles and motorcycles will be permitted in all of the national parks; in fact, the parks will be kept accessible by any means practicable.

All outdoor sports which may be maintained consistently with the observation of the safeguards thrown around the national parks by law will be heartily indorsed and aided wherever possible. Mountain climbing, horseback riding, walking, motoring, swimming, boating, and fishing will ever be the favorite sports. Winter sports will be developed in the parks that are accessible throughout the year. Hunting will not be permitted in any national park.

The educational, as well as the recreational, use of the national parks should be encouraged in every practicable way. University and high-school classes in science will find special facilities for their vacation-period studies. Museums containing specimens of wild flowers, shrubs, and trees, and mounted animals, birds, and fish native to the parks, and other exhibits of this character will be established as authorized.

Low-priced camps operated by concessioners should be maintained, as well as comfortable and even luxurious hotels wherever the volume of travel warrants the establishment of these classes of accommodations. In each reservation, as funds are available, a system of free camp sites will be cleared, and these grounds will be equipped with adequate water and sanitation facilities.

As concessions in the national parks represent in most instances a large investment, and as the obligation to render service satisfactory to the department at carefully regulated rates is imposed, these enterprises must be given a large measure of protection, and, generally speaking, competitive business should not be authorized where a concession is meeting our requirements, which, of course, will as nearly as possible coincide with the needs of the traveling public.

All concessions should yield revenue to the Federal Government, but the development of the revenues of the parks should not impose a burden upon the visitor.

Automobile fees in the parks should be reduced as the volume of motor travel increases.

For assistance in the solution of administrative problems in the parks relating both to their protection and use the scientific bureaus of the Government offer facilities of the highest worth and authority. In the protection of the public health, for instance, the destruction of insect pests in the forests, the care of wild animals, and the propagation and distribution of fish, you should utilize their hearty cooperation to the utmost.

You should utilize to the fullest extent the opportunity afforded by the Railroad Administration in appointing a committee of western railroads to inform the traveling public how to comfortably reach the national parks; you should diligently extend and use the splendid cooperation developed during the last three years among chambers of commerce, tourist bureaus, and automobile-highway associations for the purpose of spreading information about our national parks and facilitating their use and enjoyment; you should keep informed of park movements and park progress, municipal, county, and State, both at home and abroad, for the purpose of adapting, whenever practicable, the world's best thought to the needs of the national parks. You should encourage all movements looking to outdoor living. In particular, you should maintain close working relationship with the Dominion parks branch of the Canadian department of the interior and assist in the solution of park problems of an international character.

The department is often requested for reports on pending legislation proposing the establishment of new national parks or the addition of lands to existing parks. Complete data on such park projects should be obtained by the National Park Service and submitted to the department in tentative form of report to Congress.

In studying new park projects you should seek to find "scenery of supreme and distinctive quality or some natural feature so extraordinary or unique as to be of national interest and importance." You should seek "distinguished examples of typical forms of world architecture," such, for instance, as the Grand Canyon, as exemplifying the highest accomplishment of stream erosion, and the high, rugged portion of Mount Desert Island as exemplifying the oldest rock forms in America and the luxuriance of deciduous forests.

The national park system as now constituted should not be lowered in standard, dignity, and prestige by the inclusion of areas which express in less than the highest terms the particular class or kind of exhibit which they represent.

It it not necessary that a national park should have a large area. The element of size is of no importance as long as the park is susceptible of effective administration and control.

You should study exisitng national parks with the idea of improving them by the addition of adjacent areas which will complete their scenic purposes or facilitate administration. The addition of the Teton Mountains to the Yellowstone National Park, for instance, will supply Yellowstone's greatest need, which is an uplift of glacier-bearing peaks; and the addition to the Sequoia National Park of the Sierra summits and slopes to the north and east, as contemplated by pending legislation, will create a reservation unique in the world, because of its combination of gigantic trees, extraordinary canyons, and mountain masses.

In considering projects involving the establishment of new national parks or the extension of existing park areas by delimitation of national forests, you should observe what effect such delimitation would have on the administration of adjacent forest lands, and, wherever practicable, you should engage in an investigation of such park projects jointly with officers of the Forest Service, in order that questions of national park and national forest policy as they affect the lands involved may be thoroughly understood.

Cordially yours,

FRANKLIN K. LANE.

National Bureau of Railroad Service.—Of conspicuous importance was the establishment in Chicago, by the United States Railroad Administration, of the Bureau of Service, National Parks and Monuments. This occurred on June 7, 1918. Mr. Howard H. Hays was made manager of the new organization, with power to choose a corps of assistants from the personnel of various railroads. Its purpose was to become "the point of contact between the Railroad Administration and the Bureau of National Parks, the concessionaires, and others interested in the promotion of travel," and to coordinate all railroad activities looking toward the development of railroad travel in the parks. Incidentally it is expected to distribute information collected by the railroads, motion pictures and lantern slides contributed by the railroads and publications issued by the National Park Service; also to give advice regarding national parks travel to railroad ticket agents. Its first year's service was naturally limited by the general war policies governing advertising and publicity expenses, but large numbers of inquiries were answered.

Travel to national parks very large.—Notwithstanding the increase in the cost of traveling and other war restrictions on railroad travel, last year's loss in total travel to the national parks was less than 8 per cent under the large record attendance of the year before. It is not, however, with last year's attendance figures but with those scored before the war that comparison should be made. The following table is illuminating:

The national parks and the world war—number of visitors to the parks.

	Before the war—1916.	During the war.	
		1917	1918
Hot Springs	118,740	135,000	140,000
Yellowstone	35,849	35,400	21,275
Casa Grande Ruin	1,909	2,437	3,150
Sequoia	10,780	18,510	15,001
Yosemite	33,390	34,510	33,527
General Grant	15,360	17,390	15,496
Mount Rainier	23,989	35,568	43,901
Crater Lake	12,265	11,645	13,231
Wind Cave	9,000	16,742	14,431
Platt	30,000	35,000	36,000
Sullys Hill	1,500	2,207	4,188
Mesa Verde	1,385	2,223	2,058
Glacier	12,839	18,387	9,086
Rocky Mountain	51,000	117,186	101,497
Lassen	....	8,500	2,000
Total	358,006	490,705	454,841

The season's record of automobile travel treated similarly results in a comparison equally significant.

The national parks and the world war—number of private automobiles entering parks.

	Before the war—1916.	During the war.	
		1917	1918
Yellowstone	3,445	5,708	4,734
Casa Grande Ruin	470	604	630
Sequoia	736	2,334	1,627
Yosemite	4,043	6.521	7,621
General Grant	1,778	2,153	2,438
Mount Rainier	3,070	5,894	7,602
Crater Lake	2,649	2,756	3,105
Wind Cave	2,500	4,837	4,815
Mesa Verde	185	364	371
Glacier	902	1,121	1,065
Rocky Mountain	10,050	23,004	20,588
Total	29,828	55,296	54,596

The remarkable feature of both tables is the apparent effect which war has had on national parks attendance. The increase of total attendance since averages 32 per cent; the increase in automobile patronage averages 84 per cent. It should be noted that the figures quoted for 1916, the last year of peace, are the highest up to that year.

The current year's total is a surprising development for a year when war restrictions on railroad travel were expected to reduce importantly the public use of the national parks. Had there been no restrictions, doubtless it would have shown a substantial increase over last year. The reason for the decrease in railroad travel is self-evident. Automobile travel fell off somewhat because of the stopping by governmental order of all railroad advertisement; that large numbers of motorists who leave the choice of their summer activities to the last moment did not have a lot of newspaper or other advertisements to suggest national parks to them. The closing of the Yellowstone hotels started rumors that the whole park was closed, which no doubt adversely affected travel. Of course, it was never proposed to close the park; the public camps cared for all who came, and could have cared for twice as many.

The consolidation of ticket offices in the large cities also adversely affected national park travel. With opportunity gone to obtain accurate information concerning the more or less complicated routes from the East to the western parks, many preferred to spend their vacations in their customary resorts, with whose ways and means they were well acquainted.

Importance of recreational travel.—It is earnestly hoped that, with the close of war, these discouragements to travel will be fully removed before the next season. Tourist travel should be heartily encouraged. Furthermore, the important work accomplished by the railroads and this department in close cooperation during the last four years in the direction of informing the people of the country concerning the greatness of their scenic possessions and recreational areas should not be lost. The national park system is one of America's greatest assets, and it must not be overlooked in planning the development of American industry after the war.

It must be recognized that this work has just begun. Funds must be provided for its continuance. A touring division in this service would be of immense use to the traveling public, and such a division should be promptly established with the return of peace and provided with funds enough to make it effective.

Educational work should be continued.—Another important need of the future is the continuation of the educational work of this bureau with the modest backing of funds necessary to render its usefulness widely effective. Already heavy increases of national parks travel have followed upon the educational work undertaken since 1914. The war has far from checked these increases. The demand for information has steadily grown in spite of war and is now at its height. It is destined to leap into great dimensions with the swift return of peace.

In time of war prepare for peace. To this end we distributed pamphlets and other national parks literature over a territory as wide as the country. "Glimpses of Our National Parks," after an enormous circulation in its second illustrated edition, is now passing into a third edition, enlarged and completed. "The National Parks Portfolio" will soon pass into its third edition, brought up to date and enriched by many additional maps and illustrations.

A supplementary school reader intended to make national parks interesting and instructive to school children, prepared by a staff member of the National Park Service and published in New York, is finding a large sale among public schools throughout the country. If we can get the lesson into the minds of the school children of this generation, as those of past generations learned the lesson of Alpine supremacy, the future of our national parks will be secure.

Special publications have naturally been limited by the war demands upon the Public Printer. Dr. Willis T. Lee's "Geologic Story of the Rocky Mountain National Park, Colorado"; Vernon Bailey's "Wild Animals of Glacier National Park," including an account of the birds by Florence Merriam Bailey; J. S. Diller's "The Volcanic History of Lassen Peak," and others of similar importance have been placed in circulation, or will soon come from the presses of the Government Printing Office.

Films, slides, and photographs.—The National Park Service has made as wide a circulation of motion-picture films and lantern slides as its limited supplies and the congested condition of the national express service would permit.

It has not been able, however, to distribute as many national park photographs for publication as usual, because of the failure of the supplies; the demand, be it noted, was there. This failure of supplies was due principally to the inability of the western railroads under war-time restrictions to furnish us photographs. Congress has never specially appropriated money for publicity and educational purposes, but up to this year we have kept fairly abreast of the rapidly growing demand by the distribution of photographs to newspapers and magazines which the railroads gave us for the purpose.

Practical work in schools.—Special attention has been given to schools during the year. Large quantities of pamphlets relating to national parks have been introduced for class room work. The demand on the part of teachers and scholars for "Glimpses of Our National Parks" and the Portfolio has been very large.

The national parks as schools—The parks are naturally classrooms of science and before the war several universities already were availing themselves of them. The movement begun in the University of Minnesota was spreading to the East. Not only were the parks regarded as schoolrooms of geology, but also as fields for the study of botany, zoology, and ethnology.

The work of the National Park Service in promoting this use of the parks has been persistent and influential, but it has not been organized because there have been no funds for anything remotely resembling organized work. Not only this work, but all our useful work of an educational nature should be lifted out of the class of personal and voluntary endeavor, where it still remains for lack of funds, and become substantially founded as part of the regular work of the service.

Caring for wild animal life.—To care for the wild animals in the national parks and bring about conditions which make for their increase is one of the special duties of this department. In the Yellowstone National Park, where a quarter century of protection has largely repaired the ravages in a region which was still heavily stocked when protected, and in the Mount McKinley National Park, in Alaska, established before hunting reduced the great herds of game animals, we still have nature at her best. But in the other national parks, where help did not come until the wild life was nearly destroyed, it will take generations to restore the lost conditions.

Considering the important fact that a national park must overflow with animal life, as Yellowstone and Mount McKinley overflow, before becoming, from the game standpoint, helpful to the neighborhood and Nation, it is our earnest care to avoid mischievous setbacks to the steady progress of natural breeding and healthy development. In this and other respects the year just closed, although the most perilous in the history of wild-life conservation in America, has been highly successful.

Appropriations.—A total appropriation of $1,012,205 is carried by the sundry civil bill of July 1, 1918, a large increase over the appropriation of any preceding year. Of this, $50,000 is being spent by the Engineering Corps of the Army upon roads in Crater Lake National Park. Among the special improvements authorized are the construction of a new administration building and free bathhouse on the Hot Springs Reservation, the construction of a new road to avoid the so-called Gardiner Slide in the canyon of the Gardiner River in Yellowstone National Park, the continuation of the reconstruction of the El Portal Road and the building of a new bridge over the Merced River at the Sentinel Bridge site in Yosemite National Park, the building of a new bridge over the Marble Fork River in Sequoia National Park, and a new approach road to the Mesa Verde.

The revenues of all national parks except the Hot Springs Reservation hereafter will revert to the Treasury of the United States. These receipts are therefore no longer available for expenditure in the maintenance and improvement of the parks from which they arise. In making appropriations for the current fiscal year, however, Congress took into consideration the fact that a reversion of these revenues to the Treasury hereafter would make larger appropriations necessary and acted accordingly. The revenues for the fiscal year ended June 30, 1918, were the largest in the history of national park administration, reaching the grand total of $217,105.55. These figures may be compared with the revenues of the 1917 fiscal year which totaled $180,571.05. The receipts of the parks for the current fiscal year will, of course, be considerably reduced on account of the decrease in travel to several of the largest revenue producing parks.

Creation of the Katmai National Monument.—While, in so important a war year, an overworked Congress naturally created no new national parks, the system was enriched by the enlargement of the Zion National Monument in Utah, formerly known as the Mukuntuweap National Monument, and the creation, also by presidential proclamation, of the Katmai National Monument in Alaska. This monument, which was so proclaimed September 24, 1918, incloses the enormous crater of Mount Katmai, whose explosion in June, 1912, was one of the very violent eruptions in volcanic history; and by a neighboring valley, named by the National Geographic Society, which sent four exploring expeditions to the region, "The Valley of Ten Thousand Smokes." This valley, together with confluent valleys, has many thousands of steam vents, some of large size. It is a remarkable spectacle, and has special interest because it is probably a coming geyser field. While geysers can not be expected there until the earth cools for thousands of feet below the surface, which may in fact take thousands of years, this group of valleys remains not only a wonderful spectacle but an interesting hint of what the famous geyser basins of the Yellowstone National Park must once have looked like hundreds or thousands of years before man.

The explosion of Katmai left a crater of great size. Its circumference measured along the highest point of the rim is 8.4 miles. The area is 4.6 square miles. "The precipitous abyss," writes Robert F. Griggs, who explored it for the National Geographic Society, "is somewhat shorter, measuring 2.6 miles in length, 7.6 miles in circumference, and 4.2 square miles in area. The milky blue lake in the bottom is 1.4 miles long and nine-tenths of a mile wide, with an area of 1.1 square miles. The little crescent-shaped island in the lake measures 400 feet from point to point. The precipice from the lake to the highest point of the rim is 3,700 feet."

Suggested parks and monuments.—Before this report appears the Grand Canyon may have become a national park by the passage of the bill to that effect reported in mid-October by the Public Lands Committee of the House. The same bill was passed by the Senate in the spring. It is earnestly hoped that this in some respects greatest of all scenic spectacles be recognized by national parkhood at the earliest possible moment. The patriotic efforts to make it a national park have covered many years, and many bills have failed to pass Congress because of local State opposition resulting from ignorance on the part of Arizona of the magnificence and national character of her possession.

Other suggestions for national parks which are receiving earnest attention include the Mammoth Cave of Kentucky, the Sand Dunes of Indiana, an important Redwoods tract of the Pacific coast, the Mount Evans region, and the Frijoles Canyon and Pajarito Plateau region of New Mexico. A bill is also before Congress to make the Sieur de Monts National Monument on Mount Desert Island, Me., a national park, and to name it, in recognition of the war-strengthened friendship between France and America, the Lafayette National Park.

Among the national monument projects which are being seriously considered are Hovenweep, on the border line between Utah and Colorado, Scotts Bluff, Nebr., and some reservation still to be selected to perpetuate the famous palm known to science as the *Washingtonia Filamentosa.*

Yellowstone National Park.—The latest sundry civil bill relieved the troops from further patrol duty in the Yellowstone, and withdrew the construction and maintenance of the roads from the control of the Engineer Corps of the Army. All governmental functions passed to the Department of the Interior.

This is the second time the soldiers have been removed from the park. Two years ago by arrangement between the War Department and the Department of the Interior we took over Fort Yellowstone and organized a civilian ranger force, but Congress reached the conclusion that the park should not have been abandoned by the War Department and by making Interior Department funds nonavailable for protective purposes, made it necessary to recall the cavalry. It was because of the additional data, principally concerning cost and efficiency, which was placed before Congress early this year, that the Yellowstone was returned to the sole jurisdiction of the Interior Department. During the summer we have organized a ranger force consisting of a chief ranger, four assistant chief rangers, and 25 rangers, upon whom we can depend to do more effective work than many times that number of frequently changed soldiers, not specially trained and working in squads. Under the old system, road building and repairs were under the control of the Army engineers. Thus we had three separate authorities in the park, the superintendent reporting to the Interior Department, the Cavalry reporting to an Army department in San Francisco, and the engineers reporting to the War Department in Washington. Under the single-headed control of the Interior Department, road building and repairs will be conducted with increased efficiency and much greater economy.

Especial attention is invited to Mr. Mondell's bill (H. R. 11661), providing for the addition to the Yellowstone of part of the Jackson Hole country south of its boundaries, inclosing the Teton Mountains. The additions of this spectacular feature will fill Yellowstone's single scenic need; besides, the addition is absolutely necessary for the preservation of the great elk herd, which is the glory of the park.

The regrettable closing of the park hotels last summer was necessary to do justice to the concessioner in a season which at that time promised to bring little travel. Greater damage to Yellowstone's season, however, resulted from the report of the park's closing than from governmental discouragement to travel. As a matter of fact, the public camps were open and did a large business. The falling off in train travel was considerable. Only 3,206 persons entered the park by rail, as against 13,350 persons in 1917. The decrease in automobile travel was relatively small, 4,734 cars carrying 17,317 people having entered the park in 1918, as against 5,703 cars carrying 21,268 people in 1917.

Spring freshets of enormous size required an additional appropriation of $25,000 at the beginning of the season to meet the emergency. Repairs to the eastern and southern entrances were fully made in good time.

Yosemite National Park.—The new power plant began operation on May 28, 1918. It consists of a log crib diversion dam across the Merced River about a mile below the Pohono Bridge, with concrete head works opening into a 64-inch concrete pipe 400 feet long. This gives into a 54-inch redwood stave pipe 6,000 feet long, which, in connection with a steel pressure pipe of the same diameter, delivers the water to the turbines under a head of 330 feet. Two General Electric dynamos of 1,000 kilowatts each are connected with its two Pelton turbines. From here the current passes on a three-phase system to the main distributing point near Yosemite Village.

The total cost of the plant, about $212,000, was authorized under the Congressional appropriations of July 1, 1916, June 12, 1917, and March 28, 1918.

It was dedicated on September 7 last to the late Henry Floy, the electrical engineer of New York, whose voluntary study of the problem, and whose presentation of the proposition before the Appropriations Committee of the House, were the factors which largely brought about its realization.

During the year, 4 miles of the 8 miles of the El Portal road have been reconstructed. The latest sundry civil bill carries $75,000 for the construction of this work. Appropriations amounting to $55,000 for this purpose should be passed next season to complete the road. The widening of the valley roads to 20 feet and their resurfacing with from 3 to 6 inches of river gravel was necessitated by the enormous concentration of automobile travel in the valley. More than 7,000 cars were there last year. A time may come when Yosemite Valley roads for economy's sake will have to be laid in concrete.

Several new and interesting trails were built during the year.

The acquisition by gift of the Tioga road across the park north of the valley's rim has proved its enormous value in the rapid development of the park. Nearly 6,000 automobilists used it during the summer.

The work preparatory to building the dam for the San Francisco water supply across Hetch Hetchy Valley is progressing under a satisfactory contract.

The exchange of the timber on the floor of the Hetch Hetchy Valley for privately owned timber and land elsewhere in the park, which was noted in the last report, has been successfully carried through; also the exchange of carefully selected timber in the southern end of the park for 7,000 acres of other privately owned holdings and timber. These additions insure the protection of the magnificent forests bordering the Wawona and Glacier Point roads. Those areas which will be lumbered under the contract lie well away from beaten lines of travel; moreover, they will be cut over with such discrimination that another generation will see their present beauty practically renewed. While the exchange does not include the beautiful Tuolumneand Merced sequoia groves, it insures large tracts of these trees against the ax. This leads naturally to the consideration of two privately owned timbered areas outside of park limits whose protection it is a public duty to secure. One borders the Big Oak Flat road between its western park entrance westward to the crossing over the South Fork of the Tuolumne; the other borders the Tioga road between its western park entrance westward to the same stream.

Sequoia National Park.—The interesting event of the year was the discovery last April of a large limestone cave not far from well-beaten trails. Fully 4,000 feet have been explored so far and it is evident that there is much yet to see after certain openings have been enlarged. In fact, we may find a mountain of caves. This discovery was the sensation of the season in Sequoia. A trail is being built to its mouth and measures are being taken to preserve its pristine beauty.

New trail-building, the laying-out of new camp grounds, and the safe-guarding from fire of those portions of the Giant Forest acquired by purchase out of Congressional appropriations and the gift of the National Geographic Society, were the principal improvements of the year. Sequoia is rapidly becoming a celebrated camping-out area.

The Greater Sequoia.—I want once more to emphasize the great desirability of adding to this park large scenic areas lying to the north and east. With the addition of these Sequoia Park will become one of the most distinguished scenic reservations of the world. The proposition is one of large economic as well as scenic value, both to the Nation and to the State of California.

General Grant National Park.—Again this park proved its great and growing popularity among camping-out motorists. Its glorious forests and giant Sequoia and other gigantic trees afford one of the most magnificent camp grounds in America.

The public camp concession this year was granted to the General Grant Hotel Co. Mr. Worth Ryder is president of this company. He also conducts the hotel camp in the King's River Canyon, known of old as Kanawyer's. Mr. Ryder's tri-weekly saddle trips between the park and King's River Canyon were a distinguished and successful feature of the season and point to a future destiny of the General Grant National Park as one of the entrances to the "Greater Sequoia" to come.

Lassen Volcanic National Park.—The great interest shown by the public in this active volcano makes it highly desirable that Congress should enable the National Park Service to take it over in fact by making some appropriation for its maintenance and improvement. Several thousand people visited it by automobile this year.

Crater Lake National Park.—The grading of the Rim Road, for which Congress appropriated $50,000, was completed this year. The Corps of Engineers of the Army is still in charge of this road system, but it is expected that Congress will authorize its transfer to the National Park Service in the next sundry civil bill. It is clearly the intent of Congress that all work of maintaining the system shall be intrusted to this bureau, and as there is little to be done to improve the Rim Road it seems hardly necessary to require the Corps of Engineers to organize another field party next year when the superintendent of the park can perform this work at much less expense.

The project to enlarge the reservation on the north so as to include Diamond Lake, Mount Thielsen, and other scenic features of national importance has already found expression in Senator McNary's bill. This is its manifest destiny. The country proposed to be annexed is magnificently scenic and is necessary to make of Crater Lake National Park a really park-like reservation in which the visiting public can have the room and opportunity to camp out and enjoy real mountain living. Until this is done Crater Lake will never assume the place among national parks to which its supreme beauty and remarkable history destine it.

During the last summer the public camp ground on the rim was enlarged and improved and several new trails were built.

Mount Rainier National Park.—The extremely large increase in patronage was doubtless due in some part to the proximity of Camp

Lewis, one of the national cantonments. It was easy for visitors to the camp also to see the park, and for park visitors to take a look at the camp. The travel was very largely by automobile. There was a very large increase in the number of private automobiles entering the park and the regular motor transport service had to be increased to meet the demand.

Approximately $8,000 was spent during the year in clearing new camp grounds and installing new sewer and pipe systems to make them habitable. Excellent camping areas are now available at the Nisqually entrance, at Longmire Springs, Van Trump Park, and Paradise Valley.

Women guides on walking trips from the hotels and camps in Paradise Valley were employed this year with complete success. They, of course, were not permitted to conduct parties on hard trips over the glacier or to the summit of Mount Rainier, but for shorter trips involving the study of wild flowers, bird life, and other educational tours they performed excellent service.

Considerable improvement was made in the trail system. The trails encircling the mountain were put in fine condition, but were not used much during the season, probably on account of shorter vacations. Approximately $15,000 was spent on the round-the-mountain system during the year.

State game preserves should be established upon at least three sides of the Mount Rainier National Park if the wild animal life of the reservation is to increase normally.

Glacier National Park.—The position of Glacier National Park, dependent largely upon railroad patronage, was responsible for the comparatively small attendance during the past season. Train service to the park was adequate, although the Glacier Park Limited was not operated this year. The season was shortened to three months, the opening date being June 15 and the closing date September 15.

The decrease in travel was due to the same conditions that similarly affected Yellowstone National Park, the withdrawal of railroad advertising and governmental discouragement of travel for pleasure. Glacier, like Yellowstone, is still dependent to a great extent on the railroads and publicity bureaus to stimulate travel by automobile as well as by train.

Motor travel increased, and there was a noticeable increase in travel from Canada. There was some travel by motor between Yellowstone and Glacier Parks, but probably less than usual. It was divided between the Yellowstone-Glacier Bee Line Highway by way of Great Falls, the Helena route, and the route by way of Flathead Lake—all routes of the National Parks Highway.

The Montana project to build a road through Marias Pass connecting the two entrances outside of the park doubtless will prove a great convenience to motorists who desire to see the park on both sides of the Continental Divide. It will not lessen, however, the necessity to construct, sooner or later, a road across one of the magnificent scenic passes of the Continental Divide within the park.

At present the Divide is crossed by four principal trails, one of which was completed last year; another, across Browns Pass, in the northern part of the park, is accessible only to camping-out parties and seldom used. The trails across Gunsight and Swiftcurrent Passes have been used for foot and horseback travel by many thousands during the past several years. The magnificent scenery of these passes can not be looked upon by any except those physically able to walk or ride on horseback many arduous miles. The need, therefore, of an automobile road which shall make this superb scenery, unequalled of its particular kind in the world, available for vehicles is pressing. Engineers of the National Park Service are making a survey for such road for presentation to Congress.

The new trail over the Divide crosses Logan Pass and connects the great east side scenic centers at St. Mary Lake and Lake McDermott with Lake McDonald on the west side. It affords a variety of combination trips with other trails and passes.

The establishment of a fish hatchery at Glacier Park Station is an event of large importance. An increasing number of visitors to all our national parks expect to fish, and the lakes and streams accessible from the developed parts of Glacier show a great deal of depletion notwithstanding continued stocking from State hatcheries. Glacier has in its mountains many lakes magnificently fitted for trout, which, shut off from natural stocking by waterfalls, require special handling. The hatchery will make Glacier Park, within two or three seasons, one of the best fishing areas in the country.

When the Milk River reclamation project is finished by the completion of Sherburne Lake Reservoir, just across the boundary from Lake McDermott, the flooding of the reservoir will kill hundreds of thousands of trees and render unsightly the principal entrance to Glacier National Park. These trees should by all means be removed before the reservoir is flooded. This is a matter of supreme importance and the ways and means should be considered without delay. When it is remembered how great the damage to the sightliness of this great national park these dead trunks will be for many years to come, Congress may be willing to make an appropriation for their removal.

Rocky Mountain National Park.—Again has this park found itself by far the most frequented of our scenic national parks. Again its visitors exceeded 100,000, notwithstanding conditions adversely affecting railroad travel and a considerable falling off in the number of visiting automobiles.

It is to be regretted that it has not been practicable to more fully develop this great and popular reservation. The telephone system has hardly been commenced, the trail system is in its infancy, the park force is inadequately provided for, and there is but one public camp ground in an area where several are required to meet actual demands. The annual appropriation of $10,000 is too small to provide for the proper protection of the park. Large sums will be required to place this most patronized of all the national parks in a condition even approximating that of other parks, which are visited yearly by only a quarter or a third of the number of persons who flock from other States, particularly the Eastern States, to Rocky Mountain. It is to be hoped that Congress will give this need its careful consideration.

The Fall River road, which when completed will cross the Continental Divide and connect the two sides of the park, still lacks a few miles of joining its two ends. This road is being built by the State of Colorado, but progress on this work has been slow. Its completion will open to the motorists of the country a circle trip from Denver of rare magnificence.

But Congress above all things must not confuse in any way the Fall River project, which is purely a matter of Colorado State roads, with the matter of Federal appropriations for the maintenance and development of the park itself. There is great need for promptness in these appropriations.

Mesa Verde National Park.—The permanent camp across the canyon from Spruce Tree House was enlarged during the year and equipped with new furniture and electric lights. It is now a thoroughly modern camp. The large log structure near by which formerly was used as a ranger station has been turned into a very much-needed museum.

Lack of funds prevented the continuation of the investigation of the Mummy Lake group of mounds by Dr. J. Walter Fewkes, Chief of the Bureau of Ethnology. This work should be continued at the earliest possible moment. A good deal of repair work is also necessary for the proper preservation of cliff dwellings. Square Tower (Peabody) House is in special need of attention.

Hawaii National Park.—Negotiations were begun with the trustees of the Bishop estate in the matter of securing a transfer to the Government of all the lands which they own in and around this crater. The estate feels itself unwarranted in transferring the property without consideration, because all of its property is held in trust for eleemosynary purposes. But the trustees will consent to the transfer in exchange for other property of equal value out of the Territorial public lands. Warrant should be had for this from the Federal Government and the Territory, and with honest appraisers there should be little difficulty in securing the full title to all the lands within the park boundaries.

The interest which the Hawaiians themselves take in their national park is one of the potent influences for its success. All of the prominent business and professional men and officials of the Territory are intimately acquainted with the park lands. Many of them are members of organizations that have promoted these areas for years, spending money freely in making them accessible and in stimulating travel to them. Furthermore, they have contributed liberally to institutions, such as the Hawaiian Volcano Research Association, which have proved valuable to science by investigating the phenomena of volcanism.

Mount McKinley National Park.—The failure of Congress to provide funds for the administration and protection of Mount McKinley National Park has again prevented the National Park Service from taking possession of the area. Already the Interior Department has twice submitted estimates for a ranger force, the park having been created as an emergency measure to prevent the slaughter of its game. A third estimate, in amount $10,000, is being submitted to Congress with a request for an appropriation for purely protective and administrative purposes, and it is sincerely hoped that it may receive favorable attention when the next sundry civil bill is prepared. Alaska is not financially able to provide wardens to adequately patrol the park area. Its game-protection funds are too small, and any wardens that are now assigned to the park must be taken from other sections of Alaska where they are badly needed.

Hot Springs Reservation.—In April the plans for the development of Hot Springs as a great national spa were exhibited in Washington by Mr. G. R. Mann, of Little Rock, Ark., of the architectural firm of Mann & Stern, which prepared them under contract with the department. The vision thus suggested of the Hot Springs of the future shows a dignified central avenue lined upon the east by a series of bathhouses which, while highly individual, possesses a note of common feeling. Several are distinctly Spanish. Others, including the administration building, are inspired by Italian Renaissance. Yet all, treated freely, fall into a tasteful whole which is the more pleasing for its variety. At the end of the row is the Arlington Hotel. Back of this rise abruptly low densely wooded rolling hills. These are reached by stairways through three entrances between bathhouses, all leading to a park driveway behind and above the bathhouses, from which walks carry into the hillside forest.

It is planned to remove the free bathhouse from its present location, which will become the site of one of the most attractive landscape features. The new plans place it on the corner of Central and

Reserve Avenues under the same roof as the administrative rooms on the street front.

This part was planned to be carried out as soon as practicable, $190,000 having been appropriated for it, of which $50,000 is to come out of the revenues of the reservation. It is hoped that the entire plan of development may be accepted by Congress and worked out during the next few years. The architects estimate the cost of the whole, excluding the administrative building and public bathhouse, at $2,000,000.

Sieur de Monts National Monument.—Several bills before Congress plan the creation of a national park of this noble reservation upon Mount Desert Island, Me., which was presented to the Nation by a group of patriotic citizens. It was first proposed to name it the Mount Desert National Park but later bills have substituted for this title that of the Lafayette National Park—this in timely commemoration of our old friendship with France.

Senator Hale's bill naming it the Mount Desert National Park passed the Senate on June 29, 1918. A bill identical in language but changing the name to the Lafayette National Park was introduced on September 24 last, and passed the Senate on October 3. Probably nothing will stand in the way of the rapid passage of this bill and the passage of a similar bill by the House.

The first appropriation for this monument was made in the last sundry civil bill. It amounted to $10,000. The fund is being devoted to administration, to the guardianship of its wild life, to the maintenance of old trails and existing improvements, and to surveying and plans for its future development.

Zion National Monument.—Another national monument of national park quality enjoyed last summer its first complete season with public camping facilities. The Zion National Monument's initial season was successful, notwithstanding the travel limitations imposed by the war. The first custodian, Mr. Walter Ruesch, assumed his duties in August.

By presidential proclamation dated March 18, 1918, this monument was enlarged from 15,840 to 76,800 acres and the name changed from Mukuntuweap to Zion.

Casa Grande National Monument.—By presidential proclamation of August 3, 1918, Casa Grande Ruin was made a national monument. Theretofore it had been roughly classed as a national park. Mr. Frank Pinkley was appointed custodian of the ruin on April 1, 1918. Many important improvements are now in progress in this monument. The reservation is not far distant from the main traveled highways of southern Arizona, and the number of visitors to this place is increasing by leaps and bounds.

Other national monuments.—Improvements in other members of the national monument system too numerous to mention here have been completed in the course of the year and others are nearing completion at the present time. Appropriations by Congress for this work have been adequate considering the difficulty in securing and holding labor.

THE TERRITORIES.

Since the transfer under Executive order of July 15, 1909, of the supervision of affairs in Porto Rico to the Insular Bureau of the War Department the former Territories of New Mexico and Arizona have been admitted as States, and there now remains under this department the supervision of but two Territories—Alaska and Hawaii.

ALASKA.

The report of the governor shows that while the industry of the Territory during the past year has shown marked progress along certain lines, notably in the production of fish, yet in the main it has been seriously affected in consequence of the great war. The young men of the Territory have flocked to the colors in great numbers, either through the draft or enlistments; mechanics have answered the call of the Government for skilled labor, and a large proportion of the population seized by the general restlessness of the country has left for the scene of greater excitement and activity. As a result the normal industry of the country has been paralyzed; mines, fisheries, railroad construction, shops, and ships are all working with insufficient forces.

The greatest loss, he states, has been in man power; practically every outgoing steamer is loaded to capacity, and when the seasonal industries of fishing, placer mining, and railroad construction are finished for the year the exodus will be almost in the nature of a stampede. The loss of population is particularly noticeable in the interior and on the Seward Peninsula.

Under such circumstances, new development is practically impossible, nor will relief be found until after the close of the war. It is reasonable to suppose, following the declaration of peace, that men drawn from the more settled and staid portions of the United States and thrown into the atmosphere of adventure and outdoor life will not be content to settle down to their former humdrum existence in the factory, the office, or on the farm, but that they will seek a wider horizon and greater possibilities than offered by their return to former occupations; a great immigration to the Territory is looked for when once the armies of the world are disbanded.

Population.—A study of the census report of 1910 in conjunction with the figures of arrivals and departures furnished by the collector of customs seems to indicate that on June 30, 1918, there was a population of approximately 40,000 white people in the Territory. The manager of the Alaska Red Cross membership drive, in December, 1917, after extensive correspondence with postmasters and commercial organizations, made an approximation of 25,200 persons. He estimates that there will be a loss of 10,000 persons during 1918, which closely coincides with the estimate of the collector of customs. The governor's estimate of the population for June 30 is 28,000 white persons.

Gold mining.—A large proportion of the people are dependent upon the success of gold mining. Undoubtedly this industry has been the hardest hit of all Alaskan enterprises. The price of all commodities except gold has soared heavenward, while the price of gold, with its greatly increased cost of production and greatly decreased purchasing power, has remained stationary.

At present there are few working placer mines of the fabulous richness which drew the attention of the world to Alaska. Instead there are now the lower grade alluvial gravels with their more even distribution of gold, which are worked along business principles. Such mines are shutting down as rapidly as possible, awaiting the day when prices of supplies and equipment are once more normal and when labor is more plentiful. Practically all of the placer mines are found in the interior of the Territory and on the Seward Peninsula, and it is these sections which are the greatest sufferers in all lines.

Lode mining is found more in the coastal district, with all of the largest mines in the first division. The largest mines are those in the vicinity of Juneau and are working on a grade of ore in which margin of profit is very close. Owing to the low grade of ore the mines are unable to pay wages such as will attract miners, with the result that they can not obtain men in sufficient numbers to more than run the mills on one shift of eight hours, and even with only one mill shift not enough miners can be procured to break the requisite amount of ore without drawing on the mine reserves.

Transportation.—All transportation tariffs affecting the Territory have been materially increased during the year. The effect has not been particularly noticeable in the matter of foodstuffs, but a great hardship on the consumer has been worked in the tariff advance on heavy commodities, such as mine and mill equipment and supplies, coal, hay, oats, and fuel oils, etc. As transportation is vital to the growth of the Territory and even to its very existence as a commercial factor, the governor expresses the opinion that the Government may well suffer a comparatively small financial loss for the sake of aiding the Territory, which furnished trade during 1917 to the United States proper in excess of $131,000,000.

The following trade figures for the various Territories with the United States are given for purposes of comparison, to wit:

Total value of exports and imports to and from the United States, 1917.

Alaska	$181,767,788
The Philippines	126,524,812
Porto Rico	124,461,408
Hawaii	123,189,441

Agriculture.—It is hardly possible for the immediate present that agriculture can be considered in Alaska to any great extent, apart from an existing mining and fishing population. Farmers are dependent upon local markets, and owing to a depleted population, are facing a serious condition. Farming communities are those which make for the stability of the country, and they should be given every encouragement and assistance.

In the Tanana Valley the experiment stations of the Department of Agriculture have developed a Siberian wheat which has successfully ripened for four successive years and may be termed hardy to the country. This year 35 farmers of the Tanana Valley have planted 50 acres in this wheat, and next season, with the seed so raised, will probably plant in the neighborhood of 500 acres. By the establishment of a small flour mill in the farming center, by 1920 every pound of flour used in the interior of Alaska can be produced from locally ground wheat.

The vegetable growth of Alaska is surprising; a market must be supplied outside of Alaska, and this can be found only by reducing vegetables to a dehydrated form; a modern dehydrating plant is inexpensive. The most promising present market will be found in northern Siberia.

Farming is most highly developed in the Tanana Valley, but the Matanuska Valley is steadily forging to the front.

Until the markets are developed for agricultural products there should not be a too speedy rush to the farm, but as population increases and as new markets are found farming will undoubtedly become one of the Territory's greatest assets.

Alaska native school service.—The schools for native children in Alaska are under the supervision of the Bureau of Education of the Interior Department, being directly supervised by five district superintendents in Alaska, responsible to the chief of the Alaskan division of the Bureau of Education, with headquarters in Seattle. For the past year these schools numbered 71, two of which were summer schools, having a total enrollment of approximately 3,500.

These native Alaskans are self-reliant, law-abiding, and honest, and the only help that they have had from the Federal Government are the establishment of schools in the larger villages, a little medical relief, and the introduction of reindeer among the northern and western tribes. This assistance has been given them through the Bureau of Education. That the natives are loyal to the United States has been especially proved the past year through the work which the natives have contributed for the Red Cross and the purchases they have made of liberty bonds and war savings stamps. Through the agency of the teachers, Red Cross auxiliaries have been established in many native villages, and the zealous and untiring work of these native organizations is a great credit to them. The work done in knitting, sewing, etc., for the Red Cross is equal to the best work done by white organizations. Reports from 11 native villages in southeastern Alaska show that $12,320.85 was contributed toward war-relief funds and that $9,700 worth of liberty bonds and $283.70 worth of stamps were purchased. In these villages there are 1,303 Red Cross members, and during the year 16 sweaters, 328 socks, 113 wristlets, 220 gun wipes, 30 scarfs, and 12 moccasins were made for the Red Cross.

The need of a power boat for the bureau's work has been especially emphasized this year. The schools have been supplied this season with the greatest difficulty, and the shipments to the various stations have been necessarily haphazard and unsatisfactory. After completing the summer's shipping the boat would be available as a training ship at the bureau's stations in southern and southeastern Alaska, where navigation is open throughout the year. Thus the boat would be put to useful service the year around.

The native people are primarily fishermen; they are an important factor in the country, and fishing to them is essentially a means of livelihood. If commercial fishing must be permitted in rivers, a policy of limited fishing is the only one that will safeguard the food supply of the natives.

During the past year the Bureau of Education operated a very complete 20-bed hospital for natives at Juneau, while the hospital at Kanakanak, on Bristol Bay, was enlarged and completely equipped for 11 beds capacity. A modern hospital was erected and placed in operation at Akiak, on the Kuskokwim. Its capacity is also 11 beds. together with comfortable quarters for the staff. A small hospital in charge of a physician and nurse was also maintained at Nulato, on the Yukon. In addition to the hospitals physicians were stationed at Nome and Cordova, and contracts were had with resident physicians at Ellamar, Candle, and Council to care for cases in their localities. The bureau's appropriation of $62,500 is just half of the minimum amount needed during normal times to make an effective beginning.

Alaska reindeer service.—In 1892 and continuing for 10 years 1,280 reindeer were imported into Alaska from Siberia. From this nucleus there are to-day in Alaska over 110,000 deer distributed all come one of the most distinguished scenic reservations of the world. The proposition is one of large economic as well as scenic value, both to the Nation and to the State of California.

General Grant National Park.—Again this park proved its great and growing popularity among camping-out motorists. Its glorious forests and giant Sequoia and other gigantic trees afford one of the most magnificent camp grounds in America.

The public camp concession this year was granted to the General Grant Hotel Co. Mr. Worth Ryder is president of this company. He also conducts the hotel camp in the King's River Canyon, known of old as Kanawyer's. Mr. Ryder's tri-weekly saddle trips between the park and King's River Canyon were a distinguished and successful feature of the season and point to a future destiny of the General Grant National Park as one of the entrances to the "Greater Sequoia" to come.

Lassen Volcanic National Park.—The great interest shown by the public in this active volcano makes it highly desirable that Congress should enable the National Park Service to take it over in fact by making some appropriation for its maintenance and improvement. Several thousand people visited it by automobile this year.

Crater Lake National Park.—The grading of the Rim Road, for which Congress appropriated $50,000, was completed this year. The Corps of Engineers of the Army is still in charge of this road system, but it is expected that Congress will authorize its transfer to the National Park Service in the next sundry civil bill. It is clearly the intent of Congress that all work of maintaining the system shall be intrusted to this bureau, and as there is little to be done to improve the Rim Road it seems hardly necessary to require the Corps of Engineers to organize another field party next year when the superintendent of the park can perform this work at much less expense.

The project to enlarge the reservation on the north so as to include Diamond Lake, Mount Thielsen, and other scenic features of national importance has already found expression in Senator McNary's bill. This is its manifest destiny. The country proposed to be annexed is magnificently scenic and is necessary to make of Crater Lake National Park a really park-like reservation in which the visiting public can have the room and opportunity to camp out and enjoy real mountain living. Until this is done Crater Lake will never assume the place among national parks to which its supreme beauty and remarkable history destine it.

During the last summer the public camp ground on the rim was enlarged and improved and several new trails were built.

Mount Rainier National Park.—The extremely large increase in patronage was doubtless due in some part to the proximity of Camp

Lewis, one of the national cantonments. It was easy for visitors to the camp also to see the park, and for park visitors to take a look at the camp. The travel was very largely by automobile. There was a very large increase in the number of private automobiles entering the park and the regular motor transport service had to be increased to meet the demand.

Approximately $8,000 was spent during the year in clearing new camp grounds and installing new sewer and pipe systems to make them habitable. Excellent camping areas are now available at the Nisqually entrance, at Longmire Springs, Van Trump Park, and Paradise Valley.

Women guides on walking trips from the hotels and camps in Paradise Valley were employed this year with complete success. They, of course, were not permitted to conduct parties on hard trips over the glacier or to the summit of Mount Rainier, but for shorter trips involving the study of wild flowers, bird life, and other educational tours they performed excellent service.

Considerable improvement was made in the trail system. The trails encircling the mountain were put in fine condition, but were not used much during the season, probably on account of shorter vacations. Approximately $15,000 was spent on the round-the-mountain system during the year.

State game preserves should be established upon at least three sides of the Mount Rainier National Park if the wild animal life of the reservation is to increase normally.

Glacier National Park.—The position of Glacier National Park, dependent largely upon railroad patronage, was responsible for the comparatively small attendance during the past season. Train service to the park was adequate, although the Glacier Park Limited was not operated this year. The season was shortened to three months, the opening date being June 15 and the closing date September 15.

The decrease in travel was due to the same conditions that similarly affected Yellowstone National Park, the withdrawal of railroad advertising and governmental discouragement of travel for pleasure. Glacier, like Yellowstone, is still dependent to a great extent on the railroads and publicity bureaus to stimulate travel by automobile as well as by train.

Motor travel increased, and there was a noticeable increase in travel from Canada. There was some travel by motor between Yellowstone and Glacier Parks, but probably less than usual. It was divided between the Yellowstone-Glacier Bee Line Highway by way of Great Falls, the Helena route, and the route by way of Flathead Lake—all routes of the National Parks Highway.

The Montana project to build a road through Marias Pass connecting the two entrances outside of the park doubtless will prove a great convenience to motorists who desire to see the park on both sides of the Continental Divide. It will not lessen, however, the necessity to construct, sooner or later, a road across one of the magnificent scenic passes of the Continental Divide within the park.

At present the Divide is crossed by four principal trails, one of which was completed last year; another, across Browns Pass, in the northern part of the park, is accessible only to camping-out parties and seldom used. The trails across Gunsight and Swiftcurrent Passes have been used for foot and horseback travel by many thousands during the past several years. The magnificent scenery of these passes can not be looked upon by any except those physically able to walk or ride on horseback many arduous miles. The need, therefore, of an automobile road which shall make this superb scenery, unequalled of its particular kind in the world, available for vehicles is pressing. Engineers of the National Park Service are making a survey for such road for presentation to Congress.

The new trail over the Divide crosses Logan Pass and connects the great east side scenic centers at St. Mary Lake and Lake McDermott with Lake McDonald on the west side. It affords a variety of combination trips with other trails and passes.

The establishment of a fish hatchery at Glacier Park Station is an event of large importance. An increasing number of visitors to all our national parks expect to fish, and the lakes and streams accessible from the developed parts of Glacier show a great deal of depletion notwithstanding continued stocking from State hatcheries. Glacier has in its mountains many lakes magnificently fitted for trout, which, shut off from natural stocking by waterfalls, require special handling. The hatchery will make Glacier Park, within two or three seasons, one of the best fishing areas in the country.

When the Milk River reclamation project is finished by the completion of Sherburne Lake Reservoir, just across the boundary from Lake McDermott, the flooding of the reservoir will kill hundreds of thousands of trees and render unsightly the principal entrance to Glacier National Park. These trees should by all means be removed before the reservoir is flooded. This is a matter of supreme importance and the ways and means should be considered without delay. When it is remembered how great the damage to the sightliness of this great national park these dead trunks will be for many years to come, Congress may be willing to make an appropriation for their removal.

Rocky Mountain National Park.—Again has this park found itself by far the most frequented of our scenic national parks. Again its visitors exceeded 100,000, notwithstanding conditions adversely affecting railroad travel and a considerable falling off in the number of visiting automobiles.

It is to be regretted that it has not been practicable to more fully develop this great and popular reservation. The telephone system has hardly been commenced, the trail system is in its infancy, the park force is inadequately provided for, and there is but one public camp ground in an area where several are required to meet actual demands. The annual appropriation of $10,000 is too small to provide for the proper protection of the park. Large sums will be required to place this most patronized of all the national parks in a condition even approximating that of other parks, which are visited yearly by only a quarter or a third of the number of persons who flock from other States, particularly the Eastern States, to Rocky Mountain. It is to be hoped that Congress will give this need its careful consideration.

The Fall River road, which when completed will cross the Continental Divide and connect the two sides of the park, still lacks a few miles of joining its two ends. This road is being built by the State of Colorado, but progress on this work has been slow. Its completion will open to the motorists of the country a circle trip from Denver of rare magnificence.

But Congress above all things must not confuse in any way the Fall River project, which is purely a matter of Colorado State roads, with the matter of Federal appropriations for the maintenance and development of the park itself. There is great need for promptness in these appropriations.

Mesa Verde National Park.—The permanent camp across the canyon from Spruce Tree House was enlarged during the year and equipped with new furniture and electric lights. It is now a thoroughly modern camp. The large log structure near by which formerly was used as a ranger station has been turned into a very much-needed museum.

Lack of funds prevented the continuation of the investigation of the Mummy Lake group of mounds by Dr. J. Walter Fewkes, Chief of the Bureau of Ethnology. This work should be continued at the earliest possible moment. A good deal of repair work is also necessary for the proper preservation of cliff dwellings. Square Tower (Peabody) House is in special need of attention.

Hawaii National Park.—Negotiations were begun with the trustees of the Bishop estate in the matter of securing a transfer to the Government of all the lands which they own in and around this crater. The estate feels itself unwarranted in transferring the property without consideration, because all of its property is held in trust for eleemosynary purposes. But the trustees will consent to the transfer in exchange for other property of equal value out of the Territorial public lands. Warrant should be had for this from the Federal Government and the Territory, and with honest appraisers there should be little difficulty in securing the full title to all the lands within the park boundaries.

The interest which the Hawaiians themselves take in their national park is one of the potent influences for its success. All of the prominent business and professional men and officials of the Territory are intimately acquainted with the park lands. Many of them are members of organizations that have promoted these areas for years, spending money freely in making them accessible and in stimulating travel to them. Furthermore, they have contributed liberally to institutions, such as the Hawaiian Volcano Research Association, which have proved valuable to science by investigating the phenomena of volcanism.

Mount McKinley National Park.—The failure of Congress to provide funds for the administration and protection of Mount McKinley National Park has again prevented the National Park Service from taking possession of the area. Already the Interior Department has twice submitted estimates for a ranger force, the park having been created as an emergency measure to prevent the slaughter of its game. A third estimate, in amount $10,000, is being submitted to Congress with a request for an appropriation for purely protective and administrative purposes, and it is sincerely hoped that it may receive favorable attention when the next sundry civil bill is prepared. Alaska is not financially able to provide wardens to adequately patrol the park area. Its game-protection funds are too small, and any wardens that are now assigned to the park must be taken from other sections of Alaska where they are badly needed.

Hot Springs Reservation.—In April the plans for the development of Hot Springs as a great national spa were exhibited in Washington by Mr. G. R. Mann, of Little Rock, Ark., of the architectural firm of Mann & Stern, which prepared them under contract with the department. The vision thus suggested of the Hot Springs of the future shows a dignified central avenue lined upon the east by a series of bathhouses which, while highly individual, possesses a note of common feeling. Several are distinctly Spanish. Others, including the administration building, are inspired by Italian Renaissance. Yet all, treated freely, fall into a tasteful whole which is the more pleasing for its variety. At the end of the row is the Arlington Hotel. Back of this rise abruptly low densely wooded rolling hills. These are reached by stairways through three entrances between bathhouses, all leading to a park driveway behind and above the bathhouses, from which walks carry into the hillside forest.

It is planned to remove the free bathhouse from its present location, which will become the site of one of the most attractive landscape features. The new plans place it on the corner of Central and

Reserve Avenues under the same roof as the administrative rooms on the street front.

This part was planned to be carried out as soon as practicable, $190,000 having been appropriated for it, of which $50,000 is to come out of the revenues of the reservation. It is hoped that the entire plan of development may be accepted by Congress and worked out during the next few years. The architects estimate the cost of the whole, excluding the administrative building and public bathhouse, at $2,000,000.

Sieur de Monts National Monument.—Several bills before Congress plan the creation of a national park of this noble reservation upon Mount Desert Island, Me., which was presented to the Nation by a group of patriotic citizens. It was first proposed to name it the Mount Desert National Park but later bills have substituted for this title that of the Lafayette National Park—this in timely commemoration of our old friendship with France.

Senator Hale's bill naming it the Mount Desert National Park passed the Senate on June 29, 1918. A bill identical in language but changing the name to the Lafayette National Park was introduced on September 24 last, and passed the Senate on October 3. Probably nothing will stand in the way of the rapid passage of this bill and the passage of a similar bill by the House.

The first appropriation for this monument was made in the last sundry civil bill. It amounted to $10,000. The fund is being devoted to administration, to the guardianship of its wild life, to the maintenance of old trails and existing improvements, and to surveying and plans for its future development.

Zion National Monument.—Another national monument of national park quality enjoyed last summer its first complete season with public camping facilities. The Zion National Monument's initial season was successful, notwithstanding the travel limitations imposed by the war. The first custodian, Mr. Walter Ruesch, assumed his duties in August.

By presidential proclamation dated March 18, 1918, this monument was enlarged from 15,840 to 76,800 acres and the name changed from Mukuntuweap to Zion.

Casa Grande National Monument.—By presidential proclamation of August 3, 1918, Casa Grande Ruin was made a national monument. Theretofore it had been roughly classed as a national park. Mr. Frank Pinkley was appointed custodian of the ruin on April 1, 1918. Many important improvements are now in progress in this monument. The reservation is not far distant from the main traveled highways of southern Arizona, and the number of visitors to this place is increasing by leaps and bounds.

that in spite of the fact that the summer was cold and wet, the crops matured, owing to the prolongation of mild weather.

There are now five agricultural experiment stations operated under the auspices of the States Relations Service of the Department of Agriculture. Each station has been assigned to its own specific task. The Sitka station is devoted entirely to horticulture, for the reason that the heavy rainfall in the coast region prevents the growing of grain except during abnormally favorable seasons, and experiments are carried on with orchard fruits, berries, vegetables, and ornamentals.

The northernmost station is located at Rampart, in latitude 65° 31′. This station is chiefly devoted to the breeding of grains and leguminous plants. Upward of one hundred varieties of grains of all kinds have been tested there, and many new varieties have been created at that station.

The Fairbanks experiment station is located in a fine agricultural region which is being well settled with farmers. The station is, therefore, operated chiefly as a model farm so as to afford an object lesson to those who visit it.

The Kodiak station is devoted entirely to the breeding of live stock. It is stocked with a herd of Galloway cattle, which are well adapted to the country.

A station was established in the Matanuska Valley April 1, 1917. Nothing but pioneer work could be done during the first year, but some buildings have been erected and about 12 acres of land cleared, which will be cropped the current year.

Coal.—The coal-using districts of Alaska have suffered greatly through the increased cost of coal and through the inferior quality of Washington and British Columbia coal now being shipped.

The two most prominent fields, the Matanuska and Bering River, are not as yet developed on a large production basis and so are not commercially important factors, but there is no reason why all Territorial demands should not be immediately satisfied with Alaska coal, providing transportation from the coal fields can be procured.

In the interior of the Territory coal is being mined in the Nenana coal fields, but so far is only being used to a limited extent by the Alaskan Engineering Commission at Nenana.

In the Matanuska field some preliminary exploration and a little mining is being carried on by two companies holding leases, but the majority of coal being mined is for the Government under the direction of the Alaskan Engineering Commission. Sufficient coal is mined to satisfy the local demands at Anchorage and to furnish fuel to the railroad.

Petroleum.—Petroleum is now being produced in paying quantities from a few shallow wells near Katalla, with further drilling in progress. There are seepages and other oil indications on the Kenai Peninsula, the Seward Peninsula, the Alaska Peninsula, Cook Inlet, at Yakataga, and persistent rumors of oil pools found near the line of the Government railroad north of the Alaska Range. The finding of oil in quantity in any one of these localities would be a wonderful boon to the country, which is rapidly going on an oil-burning basis as price and supply will permit. The petroleum found is of a very high grade and has a paraffin base. The small plant at Katalla produces gasoline and distillate, the residue being sold for fuel oil. As matters now stand, with the exception of a few patents, the oil lands of Alaska are entirely tied up in Government withdrawal. When legislation now before Congress has been enacted, an attractive field will be opened up to the prospector financially able to bear the expense incident to oil exploration.

The draft.—The operation of the selective service law in Alaska has produced extremely gratifying results. Particularly is this true owing to the adverse conditions of transportation, mail and telegraph service, climate, and immense distances. Many registrants are located from 500 to 1,000 miles from the nearest local board and have voluntarily traveled such distances for purposes of examination and induction.

The first registration extended over the period between July 2 and September 2, 1917. The number of persons registered was 11,071, at a cost of $380.90, or 3.2 cents per registrant, as compared with the national average of 54 cents in 1917. Thirty-eight per cent of the above were aliens, of whom approximately 1,000 were alien enemies, 326 being Germans, and 118 were colored persons. No Indians were registered. Of the above, 4,496 registrants gave their permanent addresses in various other States and they were transferred thereto. Thus, the net registration was 6,575. The number finally classified in class 1 was 3,496, or 53.2 per cent.

On October 1, 1918, 2,200 registrants, or 33¼ per cent of the gross number, will have been inducted. In addition thereto many hundreds, impatient for action, enlisted prior to the registration period or joined the British and Canadian forces.

The Territory has furnished at least 3,000 men to the colors, not counting those transferred to other jurisdictions, or approximately 12 per cent of its present total white population. The expense of accomplishing the registration and selection for the first 15 months will not exceed $12,000, or $5.45 per man inducted. The national average for 1917 was $4.93. Incomplete returns disclosed that an average of 10 per cent of the registrants physically examined were rejected by the local boards. Twenty-nine per cent was the national average for 1917. Of those examined by local boards and accepted, who were again examined at mobilization camps, 2.66 per cent were rejected. The national ratio for 1917 was 5.8 per cent.

Mail service.—It is to be regretted that in the interest of economy, the mail service in the Territory is being constantly impaired. If the Post Office Department could be only brought to realize that on their service the growth of the country is as much dependent as on the work of a more typically constructive department, a world of good would be accomplished. Although writing subsequent to the fiscal year 1918, the Governor considers the situation of sufficient gravity to make a brief mention of some of the hardships entailed under the present system. After August 1, 1918, all through mail contracts to southeastern and western Alaska were discontinued, first-class mail being sent by express and second-class and parcel-post mail by freight. Mail clerks were removed from all steamers.

Shortly after August 1, the steamer *Dora* on the Seward-Nushagak run, discontinued service on acount of the loss of the mail contract. To the date of October 1 there had been no comunication with Bristol Bay and the Aleutian Islands. At Seward the governor found orders for several hundred tons of supplies which probably can not be delivered this year, with the result that many people may be forced to make their way as best they can to a base of supplies.

Such relatively important places as Skagway, Petersburg, Wrangell, Katalla, Kodiak, and Seldovia will undoubtedly suffer until spring brings a resumption of the fishing industry. The larger towns are not without their grievances also. At the best, steamer schedules are very irregular. It thus becomes imperative that a great deal of correspondence should be answered by the same steamer on which it has arrived. Under the former system mail clerks had mail sorted and classified and postmasters were thus enabled to have mail brought immediately from the ships to the post office, where it received almost instant distribution. Under the present method, there is delay in transporting the express and freight to the post office and more delay in sorting. Should a steamer be sailing late in the evening or early in the morning letters must be in the post office by 4 p. m. the day before. Even should a steamer arrive so as to allow mail distribution on the same day, it is often necessary, for the sake of making answer to illegally intrust valuable letters to an unknown passenger or face another delay until the next steamer shall arrive.

Government assistance to miners.—The experiment station of the Bureau of Mines located at Fairbanks is in full operation, filling a long-felt want on the part of miners' and prospectors. The station is thoroughly equipped to make mill and concentrating tests and qualitative determination of minerals. Advice as to process of mineral extraction is given and already mills are being constructed along designs furnished. The work is most useful and constructive.

At Anchorage the Geological Survey has located an office with one of its most competent geologists in charge, who cooperates fully with those interested in the mineral production problem of the district. The establishment of such an agency is a long step forward in governmental assistance to commercial development.

Police protection.—Outside of the incorporated towns there is but little police protection except as afforded by the various wardens and special employees for the suppression of the liquor traffic among the natives. The marshals' offices are hemmed around with restriction concerning expenditures for the detection of crime, which makes it almost impossible to prevent crime or to run down lawbreakers after a crime has been committed. A recommendation is made for the establishment of a Federal constabulary to enforce law and prevent crime.

Game laws.—The game laws are unsuited to the needs of the Territory. Congress can not devote the time necessary to the enactment of laws which will meet the many diversified conditions encountered in a country as large as Alaska. Game should be protected by the enforcement of stringent laws, but of laws made by people familiar with game and the country. There should be laws which will conserve game, but which will still allow of its use by a population dependent upon it. The governor recommends that the control of Alaskan game be passed to the Territorial legislature. At present the force of game wardens is entirely inadequate, particularly when the population is hostile to the unjust provisions of the laws and regulations.

Consolidation of departmental authority.—Alaska is suffering from conflicting departmental authority; notwithstanding the fact that even department heads have drawn attention to the great confusion existing, there has been no relief. One department should control all of the land above and below the surface, one department should control all the sea and its inhabitants, and one department should control all the land animals and birds.

Territorial banks.—At the close of the fiscal year there were 16 Territorial banks and 3 national banks, the same number as at the close of the previous year. New banks were established at Fairbanks and Cordova during the year, and there was one failure, a bank in Fairbanks having been closed in August, 1917, by the Territorial banking board. The bank of Ruby, after slightly more than a year's existence, voluntarily liquidated its affairs.

Labor conditions.—It is safe to say that every industry in the Territory is suffering from a shortage of labor. Mines, mills, fisheries, shops, and railroads are all working shorthanded. Peak production everywhere has been rendered impossible. In many instances men have given up good wages with continuous employment, urged to other environments by the national restlessness.

At Nome a more serious strike is in progress. The miners' union struck for an eight-hour day as provided by Territorial law and would accept no compromise, although the law had been found unconstitutional by the judge of the fourth judicial district. An attempted appeal was denied by the Attorney General of the United States. Until the validity of the law is finally settled there will be a recrudescence of labor troubles.

As provided in the act, under instructions of the council of defense, the eight-hour workings of the law were set aside by proclamation of the governor as applied to fisheries, for the period of one year, unless the war sooner terminates.

Bone-dry Alaska.—Prohibition in the Territory has been productive of most beneficial effects. The governor doubts if even those formerly opposed to prohibition would now be willing to return to the old régime. It is probably true that immediately before the shipment of liquor to Alaska was prohibited, large quantities of distilled and fermented liquor were imported for future illicit sales when the Territory should go dry. These caches have largely been either consumed or seized. Bootlegging is still in evidence, but it is becoming steadily less and less noticeable. The special employees for the suppression of the liquor traffic among the natives, since the advent of prohibition, are now used in the suppression of all liquor traffic. The governor thinks the employment of agents for the suppression of the liquor traffic should be continued, owing to the fact that the distillation of "hootch" is not yet a lost art and undoubtedly there are a few illicit stills and breweries scattered about in secret places.

Bureau of publicity.—A Territorial bureau of publicity is being conducted for the purpose of disseminating literature concerning the Territory and for interesting prospective investors by furnishing reliable special information. A central labor bureau is maintained and is doing much toward a general distribution of labor. Results are commencing to be shown.

Food administration.—The food administrator, with headquarters at Juneau, reports many important results accomplished, the most important of which has been the fixing of the price to be paid for salmon and other fish. In this connection, the duties of the food administrator for Alaska are among the most important in the country. A number of matters, such as stimulating the production, creating a demand for fish other than salmon, aiding in the preservation of the fish of the Territory, securing the cooperation of dealers other than those handling foodstuffs in carrying out the food program, etc., have been handled by the Alaska food administration. The cooperation and willingness of Alaskans to comply with the regulations of the Food Administration, have been most gratifying.

Public land.—During the year 16 townships, whole and fractional, of the Seward meridian, and 10 townships, whole and fractional, of the Fairbanks meridian, were surveyed.

There have been surveyed to date the following township surveys, whole and fractional, viz: Seward meridian 71, Fairbanks meridian 32, and Copper River meridian 13.

Naval patrol.—On account of seemingly well-substantiated rumors of I. W. W. and pro-German threats against the industries of Alaska, and particularly against the fish canneries, the Navy Department established a patrol in Alaskan waters to last during the fishing and packing season. The patrol consisted of four small ships, each carrying a naval intelligence officer and an officer of the Department of Justice. Every cannery was visited, all I. W. W. and alleged pro-Germans were interviewed, and several arrests of dangerous characters made. One German arrested had formulæ and material for making high explosives. Through the assistance of the patrol a number of slackers have been brought in. The presence of the patrol has, without doubt, kept in check proposed outbreaks of disloyalty and destruction of property which would have injured the fisheries at a time when the United States is in need of their products, and has lent confidence and encouragement to operators in isolated localities.

Patriotic endeavor.—Alaskans may well be proud of the showing made in the drives for the various liberty loans, war-savings stamps, and the American Red Cross. Little can be ascertained as to the amount subscribed to the first liberty loan, although it is known that a considerable amount was taken, Fairbanks subscribing over $80,000 and Juneau over $26,000. In the second loan $1,059,100 was subscribed, and in the third loan, with a quota of $687,828, subscriptions of $1,743,050 were entered, or practically 253 per cent of the quota, thus leading all the States and Territories in proportion to the allotment except Delaware, with its large war industries. On June 30 Alaska led all the States and Territories in the per capita purchase of war-savings stamps. Alaskans pin their faith to the great American Red Cross, although all worthy charities have received liberal subscriptions. In the membership drive in December, 1917, memberships were taken out to the extent of 94 per cent of the white population. In the second war fund campaign, in May, 1918, with 18,090 subscribers, the sum of $147,398.64 was raised, with a number of distant places still to be heard from, thus again leading all the States and Territories in per capita subscriptions.

For the sale of the wool from the White House sheep donated by President Wilson, Alaska returned $5,881.70 for 1¼ pounds, once more leading the States and Territories, the nearest competitors being

Nebraska, with $5,000, and Porto Rico, with $4,000. If in proportion to population the United States should have as many men in military service as has the Territory, there would now be an army of approximately 10,000,000 men.

Incorporated towns.—There are 17 incorporated towns listed as such with the secretary of the Territory. Reports received from 13 of these towns show a total assessed valuation of $14,777,646. The rate of taxation on assessed valuation for these towns ranged from 1 to 2 per cent, the average being 1.7 per cent.

Commerce.—The total commerce of Alaska with the United States for the fiscal year 1918 was $131,767,788, as compared with $121,265,947 for 1917, the increase in the export value of sea products being $12,665,418, of furs $494,085, of tin $60,315, and of other unclassified exports $1,253,001. The decrease in the value of copper shipped was $12,880,555, gypsum $42,550, stone and marble $54,185. The export of domestic and foreign gold and silver from Alaska for 1918 amounted to $15,134,523, as compared with $19,801,974 for 1917, a decrease of $4,667,451.

On imports from the United States the following increases are shown: Coal $116,674, lumber $473,992, hardware and machinery $7,567,183, provisions $528,751. Decreases were shown in liquor, $387,716, and all other unclassified items, $2,456,307.

Imports from foreign countries amounted to $967,582 and exports to foreign countries to $2,379,705. The total commerce of Alaska for the fiscal year 1918 reached the sum of $135,115,025.

Governor's office.—The governor draws attention to the building now used as an office, which he condemns as unsafe for occupancy and which will have to be abandoned before severe weather sets in. More clerical assistance is needed and higher pay asked for the secretary to the governor.

General recommendations.—The governor in his report makes the following recommendations which he considers necessary to Territorial advancement:

Gold mining should be assisted through new methods in purchasing bullion.

Transportation lines should be taken over by the Government until normal conditions reassert themselves.

The Bureau of Education should receive larger appropriations for its work among the natives.

Expert stockmen should be sent to Alaska to study and advise on reindeer conditions.

The Bureau of Fisheries should receive an increased appropriation.

Eliminations should be made from the national forests.

There should be no more withdrawals and reservations without complete investigation.

Relief should be afforded to contractor for care of Alaska insane due to increased cost of maintenance.

Navy Department should transfer to Territory old marine barracks at Sitka occupied by Pioneer's Home.

More extensive coast surveys should be made.

It is absolutely necessary that more roads and trails be provided.

Markets should be found for agricultural products.

Transportation for Alaska coal should be provided.

The mail contract system should be restored instead of shipping mail by express and freight.

A Federal constabulary should be established.

The game laws should be entirely remade and more wardens provided.

Departmental authority should be consolidated.

Authority in connection with surveys of public lands should be consolidated.

Naval patrol should be reestablished in 1919.

Sufficient funds should be provided for the proper housing and conduct of the office of the governor.

HAWAII.

The report of the governor of Hawaii shows that the financial situation for the year ended June 30, 1918, was generally favorable throughout the Territory. Sugar and pineapples continued to be the leading crops of the islands, but with the call of the Government for more home crops, gardens and small farms came into a position far more prominent than ever before; much has been done to stimulate the spirit among the school children in that respect, with very gratifying results. The Territorial fair, held for the purpose of stimulating food production and conservation, was a most successful enterprise. The result of food-production propaganda work was demonstrated by the wide range of food crops placed on exhibit by growers representing many different nationalities. Among the many gratifying sources of exhibits were those entered by the sugar plantations, indicating the progress made toward putting them on a self-supporting basis as regards the food supply for their laborers and work animals, one of the largest plantations showing that it had been able to produce practically all of the concentrate and roughage feed required by the thousand or more work animals on its properties. Another plantation had an interesting exhibit demonstrating the possibility of the production of a form of alcohol from waste cane molasses for use as a substitute for gasoline, also a working model of a corn-meal grinding plant. In years prior to the war the principal source of labor supply was from the Philippines, but owing to lack of transportation it has been impossible to get any more laborers from that source.

The National Guard and draft quotas have been principally filled by agricultural laborers, with the result that the plantations have been compelled for the time being to abandon the less productive yields. To continue to produce the former yields of food supplies it will be necessary to take some steps looking to inducing laborers to come into the Territory.

The construction of three large concrete piers in the Honolulu Harbor, one of the most important projects thus far accomplished by the board of harbor commissioners, is practically completed, and bids will shortly be solicited for the construction of the necessary buildings.

A general movement is in progress looking to the providing of larger facilities to take care of the increased shipping which will come at the close of the war. Business and civic organizations are doing much to create interest in this effort.

Owing to war conditions, the tourist business suffered a marked decrease during the year, but there is every reason to believe that when normal conditions are restored Hawaii, with its agreeable climate and natural beauty of scenery, will become a permanent resort for tourist and seasonal residents.

Since the last report, the National Guard of Hawaii has been taken into the service of the United States, and two regiments are stationed at Fort Shafter and Schofield Barracks; efforts are being made to organize a home guard, to be known as the Fifth Infantry.

Owing to a severe storm, the greatest in the history of the Territory, it became necessary to call the legislature together in special session, to provide appropriations to rebuild the bridges and approaches thereto in the district of Kohala and transact other necessary business. The session opened May 14, 1918, and completed its labors on May 31.

Imports and exports.—The imports for the fiscal year were $51,801,204, an increase of $5,442,863 over the previous year. Exports for the year ending March 31, 1918, were $80,546,606, an increase of $5,430,623 over a similar period the previous year. While the value of imports has increased for the year, the quantity has diminished. A total of 540,454 tons of sugar, valued at $64,108,540, were shipped to the mainland United States.

The following table shows imports and exports by countries for 1917 and 1918:

Countries.	Imports.		Exports.	
	1917	1918	1917	1918
Australia and Tasmania	$164,571	$118,443	$8,684	$20,284
Other British Oceania	70,166	71,974	76,194	161,923
British India	1,130,449	834,512	453	....
Canada	28,405	345,340	159,707	88,856
Chile	899,358	1,001,089	40	....
France	7,902	4,304	....	....
Germany	2,507	6,064	....	....
Hongkong	428,126	385,011	5,348	11,125
Japan	3,406,571	3,672,468	203,752	626,624
United Kingdom	86,662	68,991	7,744	196
Other foreign	258,234	288,852	173,942	242,210
Total foreign	6,482,961	6,797,048	635,864	1,151,218
United States	39,875,390	45,004,156	74,480,119	79,395,388
Grand total	46,358,341	51,801,204	75,115,983	80,546,606

The following table shows domestic exports by articles, fiscal years 1917–18:

Articles.	United States, 1918.		Foreign, 1918.[1]		Total, 1918.		Total, 1917.	
	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.
Sugar:	*Pounds.*		*Pounds.*		*Pounds.*		*Pounds.*	
Raw	1,053,701,147	$62,076,956	....	....	1,053,701,147	$62,076,956	1,127,825,256	$60,137,962
Refined	27,207,650	2,031,584	19,796	$1,427	27,227,446	2,033,011	34,812,541	2,605,310
Coffee, raw	1,967,900	275,686	1,238,122	191,003	3,206,022	466,689	2,565,471	391,568
Fruits and nuts	....	8,525,676	....	115,162	....	8,640,838	....	8,355,395
Rice	1,247,731	84,813	....	....	1,247,731	84,813	3,527,846	165,779
Hides	1,734,919	398,719	....	....	1,734,919	398,719	1,484,837	295,965
Other	....	5,972,571	....	813,945	....	6,786,516	....	3,040,826
Total	1,085,859,347	79,366,005	1,257,918	1,121,537	1,087,117,265	80,487,542	1,170,215,951	74,992,805

[1] Figures on foreign exports are for the 12 months ended Apr. 1, 1918.

Customs and internal-revenue receipts.—Customs receipts for the fiscal year were $1,009,243.48, a decrease of $159,841.32 from the previous period. Internal-revenue receipts yielded $9,686,840.94, a large increase over the previous year's receipts of $1,534,675.38.

Territorial finances.—On July 1, 1905, local governments in Hawaii were established for the first time. The Territory was then divided into four counties, one of which, namely, that comprising the Island of Oahu, was converted on January 1, 1909, into a city and county known as the city and county of Honolulu, with a mayor. The leper settlement on the Island of Molokai formed a fifth county, controlled by the Territorial board of health. The Territory continues to collect and pay over to the city and county of Honolulu and the counties of the Territory the greater part of their revenues, and in return receives back from them the cost of assessing and collecting taxes and the interest and sinking fund on bonds issued by the Territory for the benefit of the counties.

The income of the various counties aggregated $3,872,239.17, as against $3,441,102.74 for the prior fiscal year. The assessment of property, real and personal, in the Territory during the year aggregated $235,650,967, as against $231,920,919 for the prior year.

The total revenues collected by the Territory and the counties amounted to $7,208,047.73, a considerable decrease over the prior year, mainly due to larger payments of Federal war taxes, reducing the net incomes of the corporations on which amounts is paid the Territorial income tax of 3 per cent. The current cash balance on hand on July 1, 1917, was $889,508.42, and the current cash balance June 30, 1918, was $711,517.21.

Bonded indebtedness.—By the provisions of section 55 of the act of April 30, 1900 (31 Stats., 114), as amended by the act of May 27, 1910 (36 Stats., 443), the Territory is permitted to issue bonds not to exceed 7 per cent of the total assessed value of the property of the Territory, but not more than 1 per cent in any one year. The last completed assessment aggregates $235,650,957, and the borrowing limit is therefore $16,495,567.69, the outstanding bonds issued at present amounting to $8,749,000. The legislature at its 1917 session provided for a bond issue of approximately $2,500,000. The Territorial bonded indebtedness June 30, 1918, is as follows:

Date of issue.	Term in years.	Interest.	Sale price.	Percentage basis.	Aggregate outstanding.	Date due.	Where sold.
		Per cent.					
Oct. 1, 1905	5–15	4	101.375	3.70	$270,000	Oct. 4, 1920	Honolulu.
Jan. 2, 1906	5–15	3½	98.125	3.66	750,000	Jan. 2, 1921	New York.
Oct. 1, 1907	5–15	3½	98.150	3.66	294,000	Oct. 1, 1922	Honolulu.
Oct. 1, 1909	5–15	3½	98.250	3.65	200,000	Oct. 1, 1924	Do.
Aug. 1, 1911	20–30	4	101.5875	3.88	1,500,000	Aug. 1, 1941	New York.
Sept. 3, 1912	20–30	4	100.5887	3.985	1,500,000	Sept. 3, 1942	Do.
Sept. 15, 1914	20–30	4	100.01	4.00	1,430,000	Sept. 15, 1944	New York and Honolulu.
May 15, 1916	20–30	4	100.00	4.00	1,750,000	May 15, 1946	Do.
Aug. 1, 1917 [1]	20–30	4	98.04	4.08	1,055,000	Aug. 1, 1947	Do.
Outstanding indebtedness June 30, 1918					8,749,000		

[1] Total issue was $1,500,000 and up to June 30, 1918, $1,055,000 was sold.

Bank deposits and insurance.—Twenty-three banks were in operation during the year, distributed as follows: Nine in Honolulu; one each at Schofield and Waipahu, on the Island of Oahu; three at Hilo; one each at Honokaa, North Kona, and North Kohala, on the Island of Hawaii; one each at Wailuku, Kahului, Paia, and Lahaina, on the Island of Maui; and one each at Lihue and Waimea, on the Island of Kauai. Three are national banks, namely, one at Honolulu, one at Schofield, and one on the Island of Maui. One of the banks is solely a savings bank, two are solely commercial, and the remainder are both commercial and savings banks.

Bank deposits at the end of the year amounted to $34,512,712.88, of which amount $24,620,004.80 were commercial deposits and the remainder, $892,708.08, were savings deposits.

Fire insurance premiums amounted to $857,887.65 and fire losses to $41,714.87; marine premiums amounted to $452,523.41, losses

$175,036.64. Life insurance written was valued at $6,599,187, the premiums paid thereon amounted to $869,860.19, and the losses paid aggregated $297,364.31.

Corporations.—During the year 55 corporations were created and 16 dissolved, as follows, to wit: Created, mercantile 46, dissolved 14; agriculture, created 1, dissolved 2; steamships, created 1; eleemosynary, created 7; leaving at the close of the year 792 domestic corporations, an increase of 39 in all. The total capitalization of domestic corporations other than eleemosynary, etc., is $171,383,943, an increase of $1,307,715, or 0.76 per cent, for the year. Foreign corporations to the number of 144, as compared with 153 of the preceding year, are authorized to do business in the Territory. Three national banks also do business in the Territory, as compared with two of the preceding year. The classes, number, and capitalization of the domestic corporations now in existence incorporated before and after the transfer of sovereignty to the United States are as follows:

Hawaiian Corporations.

Class.	Number.			Capital.		
	Incorporated before Aug. 12, 1898.	Incorporated after Aug. 12, 1898.	Total.	Incorporated before Aug. 12, 1898.	Incorporated after Aug. 12, 1898.	Total.
Agricultural	47	106	153	$47,966,750	$35,909,015	$83,875,765
Mercantile	39	394	433	19,901,125	43,815,093	63,716,218
Railroad	5	4	9	7,370,000	7,139,960	14,509,960
Street car		2	2		1,950,000	1,950,000
Steamship	1	1	2	3,000,000	6,000	3,006,000
Bank	1	6	7	600,000	1,650,000	2,250,000
Savings and loan		13	13		776,000	776,000
Trust	1	6	7	200,000	900,000	1,100,000
Insurance		2	2		200,000	200,000
Eleemosynary	34	130	164			
Total	128	664	792	79,037,875	92,346,068	171,383,943

Public lands.—The following table shows the total area of Government lands and their estimated valuation as of June 30, 1918:

Classification.	Area.	Total area.	Estimated valuation.	Total valuation.
	Acres.	*Acres.*		
Agricultural lands		48,849.40		$3,914,184.35
Cane lands	29,659.19		$3,337,515.25	
Other agricultural lands	17,531.98		409,275.10	
Rice and taro lands	1,299.39		163,860.00	
Fish ponds, etc	358.84		3,534.00	
Net homestead area		32,047.99		844,187.46
Homesteads sold, amount unpaid	17,080.06		401,856.66	
Homesteads opened, untaken	12,478.75		282,178.55	
Homesteads surveyed, not opened	2,489.18		160,152.25	
Homesteads, exchanges and reserves		1,887.62		108,378.00
Pastoral lands (not cultivable)		484,383.60		1,352,688.60
Total saleable lands and valuation		567,168.61		6,219,438.41
Total forest lands		566,754.34		2,759,881.03
Forest lands	215,085.85			
Forest reserves	351,668.99			
Total area of lands of value		1,133,922.95		
Waste lands absolutely of no value		507,950.69		
Total public lands		1,641,873.64		8,979,319.44

The leases on many tracts of Government lands on which sugar cane was cultivated have either expired or are about to expire. In sugar production it is necessary shortly after the harvesting to get into the fields and irrigate, cultivate, and fertilize, or else the stools become lost entirely or lose entire sugar content. As it takes from six to nine months from the time that the Government comes into possession of the land on which leases have expired before all the details of the homestead law can be complied with and the homesteader placed on the land, there was a liability of great loss in the production of sugar, unless proper measures were taken to permit of the continued cultivation of the land in sugar cane. The circumstances of the case were presented to the President, and he accordingly issued the following proclamation:

CULTIVATION OF PUBLIC LANDS IN THE TERRITORY OF HAWAII.

By the President of the United States of America.

A PROCLAMATION.

Whereas by reason of the existence of a state of war it is essential to the national security and defense, for the successful prosecution of the war, and for the support and maintenance of the Army and Navy, to secure an adequate supply of sugar and other food products in the United States, including the Territory of Hawaii:

Now, therefore, I, Woodrow Wilson, President of the United States, by virtue of the powers conferred upon me by law, do hereby find and determine, and by this proclamation do announce that it is essential in order to secure such adequate food supply to continue to the fullest extent possible the cultivation of all public lands in the Territory of Hawaii now under cultivation in sugar or other food products; and for the purpose of continuing such cultivation and of maintaining the production of all such food products the Commissioner of Public Lands of the Territory of Hawaii, with the approval of the governor, is hereby authorized and empowered to enter into all necessary contracts with the lessees of any of said Government lands, the leases of which have expired or which, while this proclamation is in force, will expire, or with any other person, firm, or corporation for the continued cultivation of said lands, until such time as the same shall be occupied and cultivated by homesteaders.

And to further effectuate the purpose of this proclamation, the said commissioner, with the approval of the governor, may require of all such homesteaders at the time of entering into their special homestead agreements, a contract which may be incorporated into such special homestead agreement to continue the cultivation of their homesteads, and to reimburse any person or corporation who or which shall have done any cultivation or other work on said land, with the approval of the commissioner and governor, for the conservation of the crop thereon, to the amount of the actual cost of such work.

In witness whereof, I have hereunto set my hand and caused the seal of the United States to be affixed.

Done in the District of Columbia this 24th day of June, in the year of our Lord one thousand nine hundred and eighteen, and of the independence of the United States the one hundred and forty-second.

[SEAL.] WOODROW WILSON.

By the President:

ROBERT LANSING,

Secretary of State.

Under the provisions of this proclamation a contract has been made with the Waiakea plantation for the cultivation of about 2,000 acres, the lease of which expired June 1, 1918. Under the terms of this contract the plantation is to keep an accurate account of the actual cost of cultivation until the homesteader is put in possession. The homesteader is liable for same, and the plantation is to have a lien on the growing crops until the lien is satisfied. This one contract means the production of about 10,000 tons of sugar which would otherwise be lost. It is expected that similar contracts will be entered into in connection with other tracts.

Homesteads.—There were taken up during the year 315 homesteads, covering an area of 6,464.183 acres, at valuations aggregating $243,979.60, or $36.11 per acre, on the average. The homesteads taken averaged 20.521 acres each. They were taken by different nationalities, as follows: Hawaiians, 106; Portuguese, 99; Americans, 19; and others, 22. To enable homesteaders to obtain homesteads of suitable size for their needs, they are given the option of taking one or two or, in some cases, three lots. There were taken under special homestead agreements, 236; under certificates of occupation, 2; under right-of-purchase leases, 60; under cash freehold agreements, 10; homestead leases, 7; and special sales agreements, 180.

During the year 29 homesteads were surrendered or forfeited, covering an area of 849.71 acres. During the same period 55 transfers of homestead lots were made, having an area of 4,329.296 acres.

A total of 41 planting agreements, representing 779.59 acres, were signed. During the year there were sold at auction for cash 44 lots, including residence, church, and business-site lots, containing a total area of 35.607 acres, for $145,187.10. A total of 29 general leases, covering 102,454.803 acres, were sold at an aggregate annual rental of $20,714.50.

Patents, leases, and licenses.—There were issued during the year 199 patents, covering an area of 2,873.512 acres, for considerations aggregating $269,849.49, or at a rate of $9.39 per acre. Of these, 52 were right-of-purchase leases, 17 land exchange, 85 time payments, 2 cash freehold agreements, 26 cash purchases, 16 preference rights, 1 compromise with abutting owner, 1 homestead under acts of 1892 and 1895. There were also issued 2 patents on land-commission awards upon payment of commutation, the area being 7.073 acres and the commutation $21.50. Land and water licenses, 21 in number, were issued, bringing a total annual rental of $15,748.

Revenue and disbursements.—The total receipts of the land department were $575,015.21, as compared with $375,126.94 for the preceding year. The expenditures of the land department were $32,640.01, as against $34,348.29 expended during the previous year.

Population, immigration, and labor.—The estimated population including that of the Army and Navy on June 30, 1918, was 256,180, an increase of 64,271 or 33.49 since the census of 1910. The estimated population of Honolulu, the capital of the Territory, is 75,000. The population of the islands is divided as follows: Hawaiian, 22,850; Part-Hawaiian, 16,100; Portuguese, 24,250; Spanish, 2,270; Porto Ricans, 5,200; other Caucasian, 30,400; Chinese, 22,250; Japanese, 106,800; Filipinos, 20,400; all others, 5,660. Total 256,180. The total number of births during the year was 9,204, as against 9,365 for the previous year. The birth rate per 1,000 population was 36.71, as compared with 34.75 for 1916–17. The total number of deaths from all causes was 4,572, a decrease of 190 from the previous year. The number of steerage arrivals was 7,321 as against 8,343 for the prior year. The number of departures from the islands was 8,885, as against 7,702 for the prior year, divided as follows: Chinese, 289; Japanese, 4,737; Filipinos, 1,470; Hindus, 4; Koreans, 14; Porto Ricans, 26; Portuguese, 844; Spanish, 838; Russians, 47; all others, 485.

Public health.—Although an analysis of the year's mortality statistics reveals an increase of 512 in the number of deaths and 178 in the number of cases of contagious diseases over the previous year, the health of the Territory may be considered to have been good and the rates compare favorably with communities of similar size on the mainland. A study of the principal causes of death and an increase in the number of deaths from external causes account for a large proportion of these deaths. The annual death rate per 1,000 of population was 15.65. The number of deaths from external causes was 315 in the Territory, an increase of 51, and if these are excluded we have an annual death rate per 1,000 of population of 14.42 from disease alone. Of the total number of deaths in the Territory, 1,041 occurred in hospitals or other institutions. There were 2,039 cases of contagious and infectious diseases reported during the past year, an increase of 178 cases over the previous year. In cerebrospinal meningitis, anteric fever, leprosy, whooping cough, tuberculosis, and chickenpox an increase is noted, while in the other diseases a decrease is found. The large number of cases of typhoid at Schofield Barracks, due to the water infection and carriers, respectively, and the increased number of cases of tuberculosis reported more than accounts for the increase over the previous year.

Insane asylum.—At the end of the fiscal year, June 30, 1917, there remained in the institution, paroled or escaped, 257 males and 98 females, a total of 355. During the year 74 males and 18 females were admitted. The total number under care and treatment was 331 males and 116 females, or a total of 447. The maximum number of patients at any one time was 359, while the minimum was 340. The number of deaths during the year were 41, of which 30 were males and 11 females. Four patients escaped but one of them returned after three days. During the year 34 males and 10 females were discharged as recovered and 16 males and 1 female as improved. On June 30, 1918, there were 251 males and 94 females in the institution or on parole.

Leprosy.—On June 30, 1918, the number of lepers living at the settlement at Kalaupapa and Kalawao was 608, an increase of 21 from the previous year. Of these, 377 were male and 231 were female. During the year there were 67 deaths, 42 male and 25 female, and one patient was released on parole. The nationality of the patients of the settlement is as follows: American, 2; Belgian, 1; Chinese, 25; Filipino, 12; German, 4; Hawaiian, 367; Japanese, 13; Korean, 12; Part-Hawaiian, 121; Portuguese, 47; Porto Rican, 2; Spanish, 2.

At the Kalihi hospital there were 56 males and 24 females examined during the year and declared lepers. At the Kalihi Boys' Home on July 1, 1917, there were 37 boys and 9 were admitted during the year and 6 were discharged, leaving 40 boys remaining at the home.

At the Kapiolani Girls' Home on July 1, 1917, there were 60 girls; during the year 7 were admitted, 5 were discharged, and 2 died.

The work of the United States Leprosy Investigation Station at Kalihi consisted mainly of laboratory investigations and animal experiments; a number of papers were written but have not yet been published. Through the assistance of the president of the College of Hawaii the station has been enabled to administer chaulmoogra oil in a new form and with gratifying results.

National parks.—All of the private lands in the Mauna Loa Park area have been acquired by the Government. The trail from Kilauea to the Mauna Loa Park is being constructed by the Volcano Research Association, and there will probably be no difficulty in acquiring it if desired by the Government. No difficulty is anticipated in securing private lands in the Haleakala Park area, provided certain shooting privileges are allowed to keep the wild goats within the crater from climbing out and descending into the cane fields on the outer slopes. A bill is now in Congress to authorize the Territory to exchange lands with the estate now owning land within the area. B. G. Rivenburgh, commissioner of public lands for the Territory, is special agent for the National Park Service to attend to national park matters in the Territory.

Transportation.—Owing to the Territory's dependence on water lines for passenger, freight, and mail accommodations, the scarcity of shipping facilities as a result of the war has made itself felt to a considerable extent during the last year. Tourist travel has suffered a marked drop from that of previous years.

Of special importance to Hawaii as a stopping place for vessels crossing the Pacific Ocean is the big plant completed recently by the

Inter-Island Steam Navigation Co. of Honolulu for the discharging and bunkering of coal.

The plant is said to be as modern in arrangement and mechanism as any in existence, being electrically operated throughout. The coal, after being weighed, is delivered through adjustable chutes directly to the bunker hatches, as high as 30 feet above the water and 30 feet from the face of the dock.

A floating dry dock is also maintained by this company, which structure has a capacity of 4,500 tons, but which has lifted a vessel of 5,300 tons without showing strain from the extra load. An addition is to be made to the dock, thus increasing the capacity by 3,500 tons.

Most of the interisland traffic is conducted by the Inter-Island Steam Navigation Co. (Ltd.), which operates a fleet of 12 steamers, varying in length from 136.1 feet to 252 feet, and from 11.5 to 18 feet draft; from 341 to 1,566 gross tons and from 201 to 940 net tons. The total tonnage is 8,987 gross and 5,834 net.

During the fiscal year this company carried 90,198 passengers and 402,145 tons of freight, which is an increase of 10,983 passengers and an increase of 52 tons of freight as compared with the previous period.

The Oahu Shipping Co. operates a fleet of six vessels, which carried approximately 39,726 tons of freight during the year. No passengers are carried by this company.

The American-Hawaiian Steamship Co., which had been in the Hawaiian trade since January, 1901, handled a majority of the freight traffic between the Territory and the Atlantic coast previous to the past year. The steamers of this company are all now engaged in the transportation of Government freight between Atlantic coast ports and France.

The Canadian-Australasian Royal Mail Line continues to operate but two passenger and freight steamers on the Sydney, Auckland, Suva, Honolulu, and Vancouver route, which vessels are on a four-week schedule each way. One steamer has a gross tonnage of 13,500 tons, is 543 feet in length, and has accommodations for 667 passengers. It is asserted that at the conclusion of the European war this company will operate an additional steamer the size of the *Niagara*, and revert to its old schedule in effect prior to the war.

The Standard Oil Co. operates a fleet of five steamers between the mainland and the Territory. These vessels delivered during the calendar year 1917 a total of 477,375 barrels of fuel and refined oils, 26,433 cases and 989 barrels of lubricating and refined oils, and 644 barrels of asphaltum.

The Associated Oil Co. operates three vessels, and during the fiscal year these delivered 612,655.75 barrels of fuel oil, 141,232 gallons of distillate, and 90,512 gallons of engine and stove distillate.

The Union Oil Co. of California received during the fiscal year 462,466.17 barrels of oil at Honolulu, 61,077.77 barrels at Hilo and 9,780 barrels at Mahukona, making a total of 53,332.94 barrels for all ports.

A number of sailing vessels continue to bring general merchandise and coal from foreign ports, and several small Shipping Board boats have recently been assigned to the islands to move the 1918 sugar and pineapple crop.

The Pacific Mail Steamship Co. has continued to operate the *Ecuador*, *Venezuela*, and *Colombia*, vessels of 14,000 tons each, between San Francisco and Oriental ports with stopovers at Honolulu both ways. In addition, the company has recently inaugurated a Manila-East India service with two 16,000-ton passenger and freight steamers, the *Santa Cruz* and *Colusa*, which also stop regularly at Honolulu on the homeward voyage. The *Persia Maru*, a 9,000-ton steamer, a proffer of which by the Japanese Government was recently accepted by the United States Shipping Board, has been placed under the management of the company and is now in regular service between San Francisco and Honolulu and Manila.

The China Mail Steamship Co. (Ltd.) operates the *China*, a vessel of 3,186 tons net, and carrying first, second, and third-class passengers between San Francisco, Honolulu, and the Orient. It is anticipated that this company will also shortly place the *Nanking* on the same run.

Until May of this year the Toyo Kisen Kaisha was operating a fleet of nine steamers between China, Japan, Honolulu, San Francisco, and South American ports, all of which vessels made regular calls at Honolulu. Of the nine steamers six were on the San Francisco-Orient run and the others on the South American run. All of the South American steamers called at the port of Hilo on the outward voyage from Japan. The *Persia Maru* of the San Francisco-Orient route and the *Seiyo Maru* of the Orient-South American run have now been turned over to the United States. The *Nippon Maru* replaces the *Seiyo Maru* on the South American run, while no vessel has yet been provided in substitution of the *Persia Maru* and the *Nippon Maru* on the San Francisco schedule.

After withdrawing its vessels for several months, the Nederland Royal Mail and Rotterdam Lloyd Joint Service is again operating with 7 steamers on a 40-day service between Batavia, Java, and San Francisco, touching fortnightly at Honolulu and Japanese and Chinese ports.

The Oceanic Steamship Line is operating two vessels on a three-weeks' service between San Francisco and Sydney, by way of Honolulu and Pago Pago. One other vessel of the company was taken over by the United States Government a few months ago.

Education.—During the year there were maintained 168 public schools, with 967 teachers and 34,343 pupils, an increase of 6.4 over the past year. The cost of general maintenance of the schools during 1918 was $1,079,693.16. The cost of new buildings was $173,805.20. The number of private schools was 57, having 330 teachers and a total attendance, male and female, of 7,301. The number of pupils of all races in public and private schools in the Territory was 41,644, as against 39,028 for the year 1917.

Notwithstanding the unsettled conditions resulting from the war, the College of Hawaii continued to make healthful progress. A number of enlisted men from local Army posts took technical courses during the year to assist them in the examinations for commissions. The 143 students enrolled in the college were divided as follows, according to nationality: Caucasian, 97; Chinese, 23; Japanese, 13; Hawaiian, or part-Hawaiian, 6; Korean, 2; Hindu, 2. The number of degrees granted was 10.

There are two industrial schools in the Territory, one for boys at Waialee, on the northern shore of the Island of Oahu, and one for girls at Moiliili, a suburb of Honolulu. These institutions at present receive and care for all the juvenile delinquents who are not paroled or put on probation by the juvenile court in Honolulu, or the circuit judges of the outside islands, who also sit as juvenile judges. Instruction in these schools is chiefly of a vocational nature, and the children receive a portion of their earnings. During the year there were admitted to the boys' school, 145; 18 were released, 123 paroled, and 19 returned from parole. In the girls' school 57 were admitted during the year, 36 released, 28 released on parole, and 15 returned from parole.

Notwithstanding the many war demands on the leisure time of adults, there has been a gain in the use of books from the library of Hawaii. A large percentage of the books pertained to the war, history, and social problems of the countries involved. Registration now totals 8,197, adults being 56.4 per cent of that number and children 43.6 per cent. The increase in registration over the past year was 870 or 11.8 per cent. Home use of books totals 107,877, an increase of 10$\frac{4}{10}$ per cent. The visitors to the reading rooms numbered 53,780. The island departments have a total of 163 stations, 40 being community libraries, 53 school libraries, and 70 home libraries. The increase in stations during the year was 11, distributed as follows: Hawaii, 29; Kauai, 43; Maui, 39; Oahu, 45; Molokai, 6; and Midway, 1.

Forestry.—Toward conserving an adequate and steady supply of water for the islands where the main industries largely depend upon water for irrigation, the division of forestry has continued actively to protect the forests and extend them.

The Territory has been very fortunate during the year in the matter of forest fires, in spite of a very dry summer. Only three unimportant fires were reported.

The work of extending the forest-reserve system has progressed by creating three new reserves and adding to the area of an existing reserve. The whole island of Kahoolawe, consisting of 28,260 acres of nonwater-producing land, was also withdrawn from the forest reserve so as to return it to the jurisdiction of the land commissioner, who by law is in the only position to issue a license whereby the destructive goats on the island can be removed and the feed thereon utilized for fattening cattle for the market. The new reserves consisted of the Papapaholahola Spring on Kauai of 54 acres, the Waiahole on Oahu of 1,169 acres, and the Keauohana on Hawaii of 272 acres, and 263 acres were added to the Makawao Reserve on Maui. This brings the total number of forest reserves in the Territory up to 42, with a total area of 773,591 acres, of which 521,557 acres, or 69 per cent, is Government land.

Tree planting has progressed at the usual satisfactory rate and especial attention has been given to reforestation on water-producing areas.

Under special authority granted by the last legislature a campaign for the protection of bird, animal, and vegetable life on the small islands off the windward coast of Oahu was begun. Trespass signs have been placed on the islands, and to date 22 trespassers have been arrested and convicted.

Improvement of Honolulu.—Plans that have been in progress a number of years looking toward the development of a civic center in Honolulu have developed rapidly during the past year, and virtually all of the land necessary for future building sites has been acquired by the Territory. A recommendation that the Federal Government purchase adjoining land for the site of a headquarters building for the Hawaiian Department of the Army has been sent to Congress. The first unit of work in the reclamation of the Waikiki swamp lands, Honolulu, will shortly be started. Funds to allow this work to commence were appropriated by the special session of the Territorial legislature, May, 1918.

Territorial legislature.—The special session of the Legislature of the Territory of Hawaii convened on May 14, 1918, and completed its labors on May 31, 1918. Among the important legislation enacted was the following: Act 6: Permitting one political subdivision of the Territory to contract to do work for another subdivision or for the

Federal Government at actual cost. Act 13: Authorizing the food commission to increase, regulate, and control the food supplies of the Territory of Hawaii. Act 14: To provide for the draining and filling of certain lands at Waikiki, Honolulu. Act 16: To provide for a municipal market for the city of Honolulu. Act 18: Creating a commission to investigate feeble-mindedness in the Territory of Hawaii. Act 19: Defining disloyalty and providing punishment therefor. Act 24: To provide for an adequate food supply for the inhabitants of the Territory of Hawaii, for the purpose of which the sum of $200,000 is placed in a revolving fund to be at the disposal of the governor. Act 25: Creating a Territorial market commission, which is to bring the producer and consumer more closely together. Act 26: Providing a contingent fund of $100,000.

ELEEMOSYNARY INSTITUTIONS.

ST. ELIZABETHS HOSPITAL.

Movements of population.—On June 30, 1918, there were remaining in the hospital 3,375 patients, as against 3,244 remaining June 30, 1917, an increase of 151 patients over the previous year. There were admitted during the year 1,054, which is the largest number received in one year in the history of the institution. The total number of patients treated during the year was 4,298. The number of discharges, including deaths, was 923. The daily average population was 3,330 as against 3,209 for the year 1916–17, an increase of 121 patients.

	Male.		Female.		Total.
	White.	Colored.	White.	Colored.	
Remaining June 30, 1917	1,962	418	545	319	3,244
Admitted during year 1917–18	779	107	113	55	1,054
Total number under treatment during year ending June 30, 1918	2,741	525	658	374	4,298
Discharged:					
Recovered	213	23	32	14	282
Improved	98	16	13	5	132
Unimproved	84	14	19	6	123
Not insane	40	7	5	1	53
Died	198	49	53	33	333
Total discharged and died	633	109	122	59	923
Remaining June 30, 1918	2,108	416	536	315	3,375

Training school.—Sixty-seven attendants entered the examination for the training school, which was held October 6, 1917, 49 of whom passed the examination and were admitted to the junior class. Four pupil nurses from other hospitals, after passing the examination, were admitted during the year, 6 pupils resigned, 14 were discharged, and 8 failed in their examinations, 19 pupils remained in the junior class. At the beginning of the term, there were 34 members in the senior class, 4 of whom resigned, 4 were discharged, and 5 failed in their final examinations. Twenty-three members of the senior class received their diplomas at the graduation exercises, which were held on June 20, 1918. Except for the shortage of attendants, leaving the junior class comparatively small, work progressed satisfactorily. The shortage of nurses on the wards was relieved in a great measure by soldiers and sailors sent to the hospital for training, many of whom are doing very good work.

Staff conferences.—During the year 825 cases were presented to the conference for consideration, of which 261 were presentations for the first time, and 322 had been previously under consideration.

Hospital work.—During the year 16 major surgical operations were performed by the consulting staff. In the hydrotherapeutic department, the average number of patients treated per month was 168. Of these, 154 were white and 47 colored. In the dental department, 1,492 received treatment at various times. In the eye, ear, nose, and throat department, 362 patients received treatment. One hundred and fifty-four cases were considered by the clinical psychiatrist and assistant. In the photographic department much difficulty was experienced in securing prompt delivery of material for photographic work. There were prepared in this department 843 prints of patients for the general records, 6 for the scientific department, and 36 for general administrative purposes, making a total of 885. In the pathological laboratory 158 autopsies were performed.

Instruction.—Four groups of officers of the Medical Reserve Corps of the Army have been received at the hospital for special training and instruction. With two of these groups, the internes have taken the course of instruction. The psychological laboratory has continued its work along the lines of reeducation and rehabilitation, and has offered opportunities for study and training to the officers of the Medical Reserve Corps. Groups of enlisted men have been given special instruction to equip them for service in the hospital corps, particularly in the care of mental cases.

Industrial departments.—There has been a gradual increase in the number of patients being utilized in all branches of the service in the new industries in the laundry, on the farm, and outlying departments, particularly bodies of men who have been tried out under special attendants to look out for the lawns, gardens, and in the dairy.

The brush, broom, stocking-knitting, mattress, upholstering, hat making, and shoe manufacturing shops have been continuously in operation with gratifying results. These industrial efforts have been directed primarily to therapeutic ends, and have been of considerable value.

Provision for increased population—During the year changes have been made in a number of the buildings, such as inclosing porches, looking toward provision for additional number of beds; in particular the south porch on I building was inclosed for use as a day room, thus permitting the use of the old day room for dormitory purposes, and guards were placed on the lower porches of P building, so that they might be utilized as day rooms, thus permitting an increase in the capacity of that building.

New construction.—Under the urgent deficiency act of October 6, 1917, Congress authorized the construction, equipment, and furnishing of such semipermanent buildings as might be required to provide additional accommodations for patients, not exceeding $200,000. In carrying this act into effect, a contract was awarded to the Oscawana Building Co., of New York, at their bid of $156,700, the work to be completed in 90 days. The contractor at once proceeded with the construction of the buildings, but owing to various causes of delay in securing material, labor, and transportation, it was not practicable to complete them until November 9. These buildings will accomodate 504 patients. The dining room is large enough to take care of all patients in the buildings and the ward attendants. The kitchen will be equipped with a capacity for furnishing meals to the patients and attendants in the seven ward buildings, and is of sufficient size to enlarge the equipment to feed 1,000 people in case it becomes necessary to construct additional buildings of the same capacity. The new storehouse and shop building is being erected to the north of Howard Hall wall. The first floor and basement have been completed, the side walls and window frames for the first floor have been erected and the steel for the second floor fixed in place. An iron fence 5,630 linear feet, together with four double gates, with concrete posts and seven single gates was erected on the east side of Nichols Avenue and along the south boundary of some of the hospital property. A new ice plant has been completed and tested out, and is giving satisfactory service. Additional machinery has been installed in the bakery, consisting of labor-saving devices for the increased capacity for turning out bread. Additional machinery has been purchased and placed in the laundry, increasing its capacity, and at the same time diminishing the possibility of danger. The work in this department has continued to increase to such an extent that the total number of pieces laundered during the past year amounted to approximately 99,000 pieces more than the prior year. In addition to this, the hospital washed 180,298 towels for the Interior Department. A large number of employees left this department during the year, and they were replaced as far as possible by patient labor. Patients have been tried on the new machines, with very satisfactory results. Work on the new heating system has progressed as rapidly as conditions surrounding the procurement of labor and material would permit.

All the wells of the hospital have been practically overhauled, and are now producing an adequate supply of good drinking water sufficient for all uses. Permission was given both the Army and Navy aviation camps to run pipe lines to these wells to secure a supply of drinking water for the camps which had been constructed on the reclaimed land adjacent to the hospital.

New legislation.—In the act of Congress approved October 6, 1917, authority was given the Secretary of War during the existing emergency, to transfer to the various hospitals for the care of the insane, patients of every class entitled to treatment in St. Elizabeth's Hospital that are admitted on the order of the Secretary of War. This law authorizes the superintendents of the hospitals to pay for the care of these patients while they are being treated in other hospitals in the country and thus assist in taking care of the military insane of the enlarged Army. Under the act of October 6, 1917, the superintendent was authorized to receive in the hospital for treatment interned persons and prisoners of war under the jurisdiction of the War Department. Several of the patients who had been interned in various parts of the country have been received at the institution and confined in the Howard Hall department.

Patients from the Canal Zone are now being received at the institution under the provisions of the act of June 12, 1917, which provides for the treatment of American citizens legally adjudged insane in the Canal Zone, whose legal residence in one of the States and Territories or the District of Columbia it has been impossible to establish.

Needs of the hospital.—In 1912 a committee consisting of Surg. Gen. George H. Torney, United States Army, representing the Secretary of War; Surg. A. W. Dunbar, representing the Secretary of the Navy; Mr. Robert V. La Dow, superintendent of prisons, representing the Attorney General; Maj. William J. Judson, Corps of Engineers, United States Army, representing the Commissioners of the District of Columbia; Mr. Scott C. Bone, representing the board of visitors of the Government Hospital for the Insane; and Dr. William A. White, superintendent of the Government Hospital for the Insane, representing the department, were, after consultation with the President, designated by the Secretary of the Interior to make a thorough investigation of the needs of the hospital and the future policy for its growth and development; their report was subsequently transmitted by the President to Congress for consideration. (S. Doc. No. 256, 62d Cong., 2d sess.) This report discusses very fully the needs of the hospital under four heads: (*a*) Defects in the laws governing the conduct of the institution and the commitment of patients. Under this head is included a draft of proposed legislation for commitment from the District of Columbia, along with certain changes in the legislation with reference to the transfer of Federal prisoners to the hospital. (*b*) The advisability of continuing in the hospital patients committed from the District of Columbia and from the Army and Navy and from distant points. Under this head is discussed the whole question of the future policy of the hospital with reference to the commitment of patients from distant points. (*c*) The policy to be adopted relating to the growth of the institution, and the matter of additional lands, buildings, equipment, etc. Here the question of administration, size of the institution, and its physical needs are discussed, together with a special report as to the care of the criminal insane. (*d*) The present conduct of the institution, including recommendations for improvement of the service and the advancement of the interests of the inmates. Under the third section the needs of the hospital are set forth.

During the first session of the Sixty-fourth Congress, Senate bill 6222 was introduced "To provide for admissions to the Government Hospital for the Insane, and for other purposes," drawn along the lines recommended in the above-mentioned report, and was referred to the Senate Committee on the District of Columbia. This bill has the approval of the department, as well as of the Commissioners of the District of Columbia, and should be enacted into law at the earliest practicable date. The recommendations contained in the above-mentioned report are commended to the further consideration of Congress.

FREEDMEN'S HOSPITAL.

Movement of population.—There were received into the hospital during the year 3,648 patients, including births. These, with 244 remaining from the preceding year, make a total of 3,892 indoor patients receiving care and treatment. Of those received, including births, 1,717 were indigent residents of the District of Columbia, 1,332 were indigent residents of the States and Territories, and 609 paid for their treatment. There were discharged during the year 3,674; of this number 1,949 as recovered, 1,053 improved, 252 unimproved, 66 not treated, and 354 died. At the close of the year, there were remaining in the hospital 218 patients divided as follows: 78 United States indigents, 102 District of Columbia indigents, and 38 pay patients. There were 1,913 operations performed, with the following results: 1,412 recovered, 395 improved, 10 unimproved, 96 died. The medical service of the hospital was interrupted for short periods several times during the year by the quarantine of the medical wards on account of diphtheria and smallpox. The results of this service, as well as the surgical service, however, were very good.

In the dispensary or outpatient department 8,254 were treated in the several clinics, as follows: Medical, 1,671; minor surgical, 464; pediatrical, 956; urological, 673; gynecological, 937; oto-rhinological, 1,386; neurological, 234; orthopedical, 227; dermatological, 573; and tuberculosis, 82.

Those attending these clinics made 11,283 revisits to the several divisions of this department, 2,145 being for surgical dressings. Contrary to what was expected, in view of the increased population of the city there was a falling off in the number of patients treated both indoor and outdoor as compared with the preceding year.

The demands upon the hospital during the past year can not be said to have been greater than the preceding one, but in many instances they were more difficult to satisfy. The unusual cost of all supplies, the difficulty of obtaining competent help, and the loss of so many members of the medical and surgical staffs who entered the military service added to the task of complying with many legitimate demands.

These difficulties, however, may be said to be only trifling incidents to the war in which the country is engaged, and can be borne, serving as a reminder that the greatest possible efforts should be constantly put forth to keep the work of the hospital in all respects up to the highest standard.

On account of the high cost of all hospital supplies, it became necessary to increase the rates of pay patients. Accordingly, with the approval of the department, the following rates became effective July 1, 1918, to wit: Private rooms, $1.50 per day; general ward, adults, $1.25 per day; children, 75 cents per day; babies, 40 cents per day.

Hospital needs.—There are several important items considered necessary for the full development of the hospital which have been urged in previous annual reports. These needs still exist, but it would seem that the necessities of war make it proper not to press these claims very strongly at this time. Therefore, the items concerning the repairs of the buildings and salaries are the only ones urged at present.

The problem of labor, too, is becoming more serious daily. Better pay is being offered by all other institutions, which fact places the hospital at a decided disadvantage. As a result, employees leave, frequently without notice, when higher salaries are in sight. It is urged, therefore, that the salaries all along the line be increased, so that the hospital can compete with other institutions in the labor market.

Training school for nurses.—The training school for nurses at present provides a course of three years and requires a high-school education as an essential for entrance. There are 48 pupil nurses in training, not enough for a hospital of this size, making an eight-hour shift impossible, thus endangering the health of the nurses, and reducing the efficiency of the force.

Special instructions in dietetics at Howard University were continued during the year; also a course on public-health nursing was given by the District of Columbia League of Nursing Education at the central registry. Five of the nurses who attended the lectures on public health last year were given two months' practical experience with the Instructive Visiting Nurse Society of this city. One nurse, after completing her training, was appointed to the regular staff of the Instructive Visiting Nurse Society.

The graduating exercises were held May 8, 1918, in the Andrew Rankin Memorial Chapel, 8 nurses graduating, making a total of 306 holding certificates from the school.

Pay patients.—In the act "making appropriations to provide for the expenses of the District of Columbia for the fiscal year ending June 30, 1913, and for other purposes," approved June 26, 1912, provision is made, under the head of "Medical charities," as follows:

> Hereafter patients may be admitted to Freedmen's Hospital for care and treatment on the payment of such reasonable charges therefor as the Secretary of the Interior may prescribe. All money so collected shall be paid into the Treasury to the credit of Freedmen's Hospital, to be disbursed under the supervision of the Secretary of the Interior for subsistence, fuel and light, clothing, bedding, forage, medicine, medical and surgical supplies, surgical instruments, repairs, furniture, and other absolutely necessary expenses incident to the management of the hospital, a report as to the expenditure thereof to be made annually to Congress.

Under this provision 609 pay patients were received for treatment during the fiscal year 1918, as against 375 for last year, the receipts for the same amounting to $11,455.35.

Receipts and disbursements.—The receipts and disbursements of the hospital are as follows:

RECEIPTS.

Appropriation, sundry civil act:		
For support	$30, 000. 00	
Salaries	32, 640. 00	
		$62, 640. 00
Appropriation, urgent deficiency act		5, 448. 00
Appropriation, District of Columbia (under contract with Board of Charities)		35, 000. 00
Pay patients		11, 455. 35
Total		114, 543. 35

DISBURSEMENTS.

Miscellaneous:		
Fuel, light, clothing, forage, medicine, etc	$32,874.91	
Urgent deficiency act	5,212.08	
Pay patients	1,845.88	
Subsistence	31,834.59	
Pay patients	6,228.33	
Salaries	32,184.93	
Pay patients	2,803.94	
Refunds, pay patients	470.05	
		$113,454.71
Total unexpended balance		1,088.64

Unexpended balances: Fuel, light, clothing, forage, medicine, etc., $125.09; urgent deficiency act, $235.92; pay patients, $107.15; subsistence, $165.41; salaries, $455.07; total, $1,088.64.

HOWARD UNIVERSITY.

The university was incorporated by the act of March 2, 1867 (14 Stat., 438). The object of the incorporation named in the first section of the act was "for the education of youth in the liberal arts and sciences." It is declared that the incorporators shall be "a body politic and corporate, with perpetual succession," etc. The management and control of the institution were vested in a board of not less than 13 trustees.

Students.—There were in attendance during the year 1,493 students from 37 States and 13 foreign countries. This number does not include 90 students who by correspondence took the work in the school of theology.

Students during year ended June 30, 1918.

College of Arts and Sciences	335
Teachers' College	114
School of Manual Arts and Applied Sciences	257
Conservatory of Music	113
School of Theology	51
School of Medicine	302
School of Law	72
Academy	279
Commercial College	134
Total	1,657
Names duplicated because of students taking special courses in different departments	164
	1,493
Correspondence students not counted above	90
Final total	1,583

Two hundred and twenty-seven completed their studies in the university and were graduated, distributed as follows:

Graduates in 1918.

College of Arts and Sciences	49
Teachers' College	21
Normal course	1
Kindergarten	3
School of Manual Arts and Applied Sciences	2
School of Theology	12
Medical College	24
Dental College	52
Pharmaceutic College	8
School of Law	19
Academy	30
Commercial College	6
	227

The president of the institution, in commenting upon the work of the past year, says:

> The experience of the year showed that the university was ready to take a large part in the support of the United States in the war. Teachers of all departments have become officers, and some of them are across the water. The same thing is true of many students. The teaching of radio work continued from November, 1917, to the end of the session.
>
> It became evident in April, 1918, that the War Department needed the university for the training of drafted men. The trustees voted at once to close the session a month ahead of time, and commencement was held upon May 8. On May 16, 300 drafted men were placed in the dormitories by the War Department to be taught radio work, bench woodwork, and electrical repair work. Much of their time is occupied with military drill and physical exercises. The university is for the summer a military post, and the success of the work is exceptionally fine.
>
> The university rejoices in the spirit of patriotism which pervades it and in the very important contributions it is making to the welfare of the Nation.

Appropriations.—Although the institution was established in 1867, no appropriation was made by Congress for its support until March 3, 1879, when $10,000 was appropriated for "maintenance." From that date up to July 1, 1918, the date of approval of the last sundry civil act, Congress has appropriated for the university for various purposes, mostly current expenses, a total of $2,101,277.75.

All of the Government appropriations are expended by the Secretary of the Interior, who is a patron ex officio of the board of trustees.

Property.—The treasurer of the institution, in a report dated September 1, 1918, gives the total value of all property belonging to the university at the close of the fiscal year, June 30, 1918, as $1,832,038.14, of which $431,871.36 represents endowments, unproductive land fund, cash in bank, etc. The remainder of the property belonging to the university, valued at $1,400,166.78, consists of the following: Land, $616,057.47; buildings, $619,857.52; and equipment, $164,251.79.

This large property has been accumulated mainly from donations and the sale and the increase in value of about 120 acres of land originally purchased and subdivided by the university. The annual congressional appropriations have been mainly for the payment of salaries, the purchase of supplies, care of grounds, and other current expenses. Two buildings and a portion of the equipment have also been provided from Government appropriations.

COLUMBIA INSTITUTION FOR THE DEAF.

There were under instruction during the fiscal year ending June 30, 1918, in the department known as the Gallaudet College, 61 men and 53 women, a total of 114, representing the District of Columbia and 36 States. In the primary department, known as Kendall School, there were under instruction 25 boys and 28 girls, a total of 53, of which 39 were admitted from the District of Columbia. During the fiscal year 53 students and pupils were admitted and 52 were discharged by graduation and otherwise.

The usual standard of good health has prevailed among the students and pupils. No serious cases of illness have occurred.

The course of instruction was changed to require two hours' work in drawing instead of one as heretofore. Applied art was made optional for sophomore and junior women. A department of printing was opened and practical work in this line offered as an optional course to qualified students. Practically all the printing required by the institution was done in this department by the instructor and students. A special course in the conservation of food was given to young women students.

The total receipts of the year, excluding balance of $962.77 in the private funds, were $117,526.14, which includes balance of $946.60 at the beginning of the fiscal year. The total expenses were $115,538.66, leaving a cash balance on hand June 30, 1918, of $1,987.48.

Estimates of appropriations for the fiscal year to end June 30, 1920, are as follows: For the support of the institution, including salaries and incidental expenses, for books and illustrative apparatus, and for general repairs and improvements, $106,000; for repairs of the buildings of the institution, including plumbing and steamfitting, and for repairs to pavements within the grounds, $10,000; for painting and equipping new women's dormitory building and finishing grading and walks adjacent thereto, $7,000.

The completion of the new dormitory for women, constructed under the supervision of the Superintendent of the Capitol Building and Grounds, affords a much needed addition to the accommodations of this institution. The appropriations for this structure, the exterior of which is of red tapestry brick with limestone trimmings, aggregate $182,500.

On presentation day the honorary degree of master of arts was conferred upon Rev. John Henry Keiser, of the class of 1905, now Episcopal minister to the deaf, New York City. At the close of the year the degree of master of arts was conferred upon 2 graduates of the college. The degree of bachelor of philosophy was conferred upon 1 graduate of the college; the degree of bachelor of science upon 2 graduates, and the degree of bachelor of arts upon 14 graduates. Certificates of graduation were granted to 3 normal students.

The department has no supervision over the expenditures of the appropriation made by Congress, or general supervision over the administration of the affairs of the Columbia Institution for the Deaf. The only duty devolving upon the Secretary of the Interior in relation to this institution at this time is the reception of the annual report thereof and the admission of indigent deaf mutes of the several States and Territories to that institution for instruction in the collegiate branch thereof. Legislation should be enacted by Congress placing the control and maintenance of the Columbia Institution for the Deaf under the president and board of directors thereof and requiring them to report directly to Congress as to the administration of the institution.

MARYLAND SCHOOL FOR THE BLIND.

Section 2 of the act of Congress approved May 29, 1858 (11 Stat., 294), authorizes the Secretary of the Interior to place for instruction in an institution for the blind, in the State of Maryland or some other State, the indigent blind children of teachable age who are children of persons actually engaged in the military and naval service of the United States, and under section 4869, Revised Statutes of the United States, the blind children of teachable age belonging to the District of Columbia.

The act of May 26, 1908 (35 Stat., 295), making appropriations for the District of Columbia provided that after July 1, 1908, a contract should be entered into by the Commissioners of the District of Columbia for the instruction, in Maryland or some other State, of indigent blind children of the District, appropriated $6,000 for the purpose, and repealed the permanent indefinite appropriation under section 3689 of the Revised Statutes. Inasmuch as the Secretary of the Interior, by section 2 of the act of May 29, 1858 (11 Stat., 293), was also charged with providing for the instruction of the blind children of all persons in the military and naval service of the United States, while such persons are actually in such service, the expense to be defrayed from the permanent indefinite appropriation above referred to, the question was submitted to the Comptroller of the Treasury as to whether that appropriation was repealed so far as to be no longer available for the instruction of this class of beneficiaries. In an opinion rendered October 27, 1908, the Comptroller of the Treasury held that the act of May 26, 1908, supra, only repealed the provisions of section 3689 of the Revised Statutes to the extent that said section provides for the education of the blind children of the District of Columbia, and that the permanent indefinite appropriation in question is still available for instructing the blind children of all persons in the military and naval service of the United States, in some institution in Maryland or some other State, and that the Secretary of the Interior is authorized to continue to issue permits for the instruction of such children. No permits for this class of beneficiaries were issued during the last year.

SUPERINTENDENT OF THE UNITED STATES CAPITOL BUILDING AND GROUNDS.

The Superintendent of the United States Capitol Building and Grounds states in his annual report that during the fiscal year extensive exterior painting has been completed. This work not only includes the exterior of the central portion of the Capitol and the dome, but the painting of all window frames and sash of the entire building, 43,536 pounds of paint having been used in covering an area estimated at 130,488 yards. Other general repairs include the repairs to all roofs and skylights and the plumbing of the entire building, and necessary attention to all elevators, lifts, and refrigerating apparatus. Minor repairs during the year number 890.

Senate wing.—A new door has been installed connecting the rooms of the Senate Committee on Naval Affairs, the 10-inch steam pipe in the heating plant of the Senate has been removed, and 50 feet of 6-inch pipe installed in its place, cement floor laid in room 11 of the Senate terrace, and the rooms of the west and north terrace to be used as storage rooms, the rooms of the President, Vice President, office of the Sergeant at Arms of the Senate, walls of Senate Chamber, cloakroom, lobby and reception room retouched, and 12 of the Senate committee rooms painted and retouched as required.

House wing.—In the committee room of Foreign Affairs, a new marble mantel has been installed. In the main corridor of the subbasement 1,500 feet of cement floors have been laid, walls of the corridors of the House terrace have been painted, doors in the House Gallery refinished, and 11 committee rooms and offices painted and retouched.

Capitol Grounds.—On account of the settlement of the tunnel in First Street, it has been necessary to rebuild 1,530 linear feet of granite wall, reset 1,530 feet of granite curb, lay 3,450 square yards of cement sidewalks, and 1,400 feet of asphalt pavement, reconstruct the tunnels or repair the same used for heating pipes and electric wiring, fill in and regrade the portion of the east side of the park affected by this settlement, which included 1¼ acres affected by the tunnel repairs. Other work upon the grounds includes trimming of trees and shrubs, removal of deadwood, replanting where trees or shrubs have been removed, spraying for trees affected with scale or elm beetle, installation of two granite columns at the drinking fountain at the west side of the grounds, resetting and pointing fountain bases and electric light pedestals, and resetting and repointing 2,700 linear feet of coping and repairs to walks and driveways.

Capitol power plant.—Continued success marks the operation of this plant during the past year. With the concurrence of the House Office Building Commission, the new Interior Department Building has lately been supplied with current from this plant, pending the construction of a central heating, lighting, and power plant by the Treasury Department. The commission has also given its approval for the installation of a breakdown service between this plant and the navy yard of such a character as to be mutually serviceable to the navy yard plant and the Capitol power plant.

Engine house, Senate and House stables.—Necessary repairs to roofs of the Senate stables and cottage have been made and the roofs painted; the wagon shed at the House stables converted into a garage for the use of the trucks of the House post office and folding rooms; new cement floors put down, a new toilet installed, the garage painted, all needed repairs to doors and windows attended to, and the heating system of the United States Botanic Garden extended to the garage.

Court of Claims Building.—General repairs, including painting and ordinary repair work to supplement and complete the more extensive repairs of the preceding year, have been attended to, and new furniture and equipment and electric apparatus for lighting purposes supplied.

Reconstruction of courthouse, Washington, D. C.—Satisfactory progress has been made in the prosecution of this important work. The exterior stonework has reached the third-floor levels on the north, east, and west sides of the building, the front being delayed on account of the complicated nature of the work of the porticoes. The groundwork of the heating and ventilating system is practically completed and the work as a whole is estimated to be about 60 per cent completed.

New women's dormitory, Columbia Institution for the Deaf.—Completion of this building is reported at a cost of $182,500. Its exterior is of red tapestry brick with limestone trimmings, dimensions 102 feet by 71 feet 6 inches by 56 feet 6 inches, and comprises suitable departments for athletics, domestic service, administration service, hospital service, public halls, dormitory accommodations for 60 students, and a large recreation space on the roof.

United States Botanic Garden.—An increased service in the distribution of plants, trees, and shrubs is reported during the past fiscal year. Needed improvements in the heating plant of the main conservatory have been made, old boilers removed, and modern boilers installed. Greenhouse No. 7 on the Maryland Avenue reservation has been entirely remodeled, and this building, formerly used for storage purposes, is now in all respects a modern, well-equipped greenhouse. Asphalt pavement around the Bartholdi Fountain has been replaced with new concrete pavement, the room above the superintendent's office has been equipped as an office, necessary repairs to the greenhouses, storerooms, and packing sheds made, and the buildings located on the Maryland Avenue portion of the garden wired for electric lighting.

Enlarging the Capitol Grounds.—The act of August 26, 1912 (37 Stat., 594), imposes on the Secretary of the Interior the duty of renting until removed property acquired under the act of June 25, 1910 (36 Stat., 739), and supplementary acts for the enlargement of the Capitol grounds. During the fiscal year 1917 no properties additional to those acquired during 1916 and prior years was secured. As to the properties in square 633, the title to which is in the United States, no action has yet been taken by the Superintendent of the Capitol Building and Grounds toward removing the buildings thereon, and they have accordingly been rented as far as practicable at nominal rates.

From December 1, 1917, to October 24, 1918, rents have been collected from the properties in said square and deposited in the Treasury by the chief disbursing clerk of this department, amounting in the aggregate to $646. Paragraph (*e*), section 1, of the act of May 16, 1918, entitled "An act to authorize the President to provide housing for war needs," is as follows:

> (*e*) To take possession of, alter, repair, improve, and suitably arrange for living purposes, to be used under the terms of this act, all houses on square six hundred and thirty-three except the Maltby Building, owned by the United States, together with any other houses in the District of Columbia owned by the Government and not now occupied. The President shall, in the construction of buildings in the District of Columbia, make use of any lands owned by the Government of the United States deemed by him to be suitable for the purpose and which have not heretofore been dedicated by act of Congress for specific buildings.

On the request of the president of the United States Housing Corporation, acting for the Secretary of Labor, all of the houses in square 633, bounded by New Jersey Avenue, B and C Streets NW., have been turned over to that corporation to be repaired for occupancy under the provisions of the above-mentioned act.

AMERICAN ANTIQUITIES.

The act of June 8, 1906, entitled "An act for the preservation of American antiquities," provides, among other things:

> SEC. 3. That permits for the examination of ruins, the excavation of archæological sites, and the gathering of objects of antiquity upon the lands under their respective jurisdiction may be granted by the Secretaries of the Interior, Agriculture, and War to institutions which they may deem properly qualified to conduct such examination, excavation, or gathering, subject to such rules and regulations as they may prescribe: *Provided*, That the examinations, excavations, and gatherings are undertaken for the benefit of reputable museums, universities, colleges, or other recognized scientific or educational institutions, with a view to increasing the knowledge of such objects, and that the gatherings shall be made for permanent preservation in public museums.
>
> SEC. 4. That the Secretaries of the departments aforesaid shall make and publish from time to time uniform rules and regulations for the purpose of carrying out the provisions of this act.

Archæological explorations.—The uniform rules and regulations promulgated by the Secretaries of the Interior, Agriculture, and War pursuant to the above-mentioned act, under date of December 28, 1906, provide (par. 3) that—

> Permits for the excavation of ruins, the execavation of archæological sites, and the gathering of objects of antiquity will be granted by the respective Secretaries having jurisdiction to reputable museums, universities, colleges, or other recognized scientific or educational institutions, or to their duly authorized agents.

During the year five permits were granted for the examination, excavation, and gathering of specimens as follows:

July 31, 1917, to the United States National Museum, acting through Mr. Neil M. Judd, aid in the Division of Archæology, to make reconnoissance, conduct excavations, and gather collections of archæological specimens, etc., on the public domain in that portion of Utah lying west of the Wasatch Mountains, or more specifically in Kane, Garfield, Millard, Tooele, and Boxelder Counties; the material collected to be shared equally between the University of Utah and the National Museum, as the expedition was to operate jointly with the University of Utah.

October 27, 1917, to Dr. Robert F. Gilder, archaeologist, University of Nebraska, to make examination and gatherings of specimens and preliminary reconnoissance for archaeological purposes on Indian reservations and public lands in certain counties in southern Arizona.

April 1, 1918, to the Museum of the American Indian (Heye Foundation, Mr. George G. Heye, director), New York, N. Y. (renewal of permits heretofore granted), to conduct archaeological excavations and gather collections from the historic pueblo ruin of Hawikuh, about 1 mile northwest of the summer village of Ojo Caliente on the Zuni Indian Reservation, western New Mexico, the work to be conducted under the immediate supervision of Mr. F. W. Hodge, of the Museum of the American Indian, and the collections gathered to be deposited in said museum.

June 1, 1918, to the American Museum of Natural History, New York, N. Y. (Dr. Clark Wissler and Mr. Earl H. Morris, representatives of the said museum), to locate and map ruins lying on public lands in San Juan County, Utah, and La Plata, Archuleta, and Montezuma Counties, Colo.; to pick up from the surface or to remove from any exposed part of each ruin specimens of pottery, stone implements, and human bones; also to make soundings by means of a sounding rod or by post holing at a few points to locate the extent and size of refuse heaps and burial grounds and to excavate in that respect not more than 10 sites, the amount of excavation not to exceed one-quarter of any one of such deposits, etc.

June 19, 1918, to the American Museum of Natural History, New York, N. Y. (Dr. Clark Wissler), for Messrs. Hyde and Morris, as the representatives of the said museum, to conduct excavations and gather collections in the cliff ruins and other aboriginal remains on public lands in the Grand Gulch, San Juan County, Utah, during 1918, all collections to be deposited in the American Museum of Natural History.

GENERAL EDUCATION BOARD.

This corporation, which was created by the act of Congress approved January 12, 1903, section 6 of which requires the corporation to annually file with the Secretary of the Interior a report, in writing, stating in detail the property, real and personal, held by the corporation, and the expenditure or other use or disposition of the same or the income thereof during the preceding year, has for its object the promotion of education within the United States. The corporation owns no real estate, its property consisting of securities and money divided into various funds, according to the purpose for which it is to be used.

On June 30, 1918, the principal funds belonging without restriction to the board amounted to $34,144,110.67, invested in stocks and bonds.

The income from the above funds, together with the income from undisbursed income, amounted during the year to $2,923,427.01. The balance of income from previous year as of June 30, 1917, amounting to $7,821,664.24, together with miscellaneous refunds, increased the total to $10,745,641.25.

Disbursements from income during the year were as follows:

Universities and colleges for whites, for endowment	$1,082,255.60
Colleges and schools for whites, for current expenses	10,000.00
Medical schools	1,000,000.00
Professors of secondary education	34,707.56
Rural school agents, white	51,574.75
Lincoln School	92,500.00
Consolidated rural schools	8,000.00
Colleges and schools for Negroes	136,137.95
Meharry Medical School (Negro)	7,500.00
Rural school agents for Negroes	40,701.28
Summer schools for Negroes	6,389,75
County training schools for Negroes	13,619.20
Home-makers' clubs for Negroes	16,400.00
Scholarships to Hampton and Tuskegee	23,101.07
Negro rural school fund	300.00
Maine agricultural demonstration work	20,491.54
New Hampshire demonstration work	15,000.00
Educational investigation and research	31,975.06
Cost-accounting system in Gary	1,025.32
Model county organization	9,925.00
Supplemental fund	3,369.26
University of Chicago (interest)	12,311.62
Maryville College	1,250.00
Administration expense	91,118.13
Total	2,709,653.09
In addition to the above there was spent for schools from principal funds	60,000.00

This leaves an undisbursed balance of income on June 30, 1918, of $8,035,988.16. It is invested as follows: Bonds and stocks, $7,627,728.97; cash, $345,415.51; accounts receivable, $62,843.68.

It should be noted, however, that against this balance there are unpaid appropriations amounting to $7,003,486.27.

The John D. Rockefeller special fund is a fund which Mr. Rockefeller controls as to principal and income.

The principal of this fund, as originally received, as mentioned in a previous report, has been completely used, so that at present it is composed only of the income earned by that portion of the fund set aside for the University of Chicago which remains undelivered, together with income from undisbursed income. The income thus earned during the year was $135,150.71. The balance from previous years ($130,526.30) makes a total of $265,677.10.

Disbursements during the year for expenses were $721.79.

This leaves a balance of $264,955.31, invested as follows: Bonds, $200,000; cash, $64,055.31.

The Anna T. Jeanes fund, the income to be used for negro rural schools, amounts to $200,000. It is invested as follows: Bonds, $163,877.51; stocks, $35,645; cash, $477.49.

The income from this fund during the year was $10,341.10. Added to the balance from the previous year the total available income amounted to $16,863.04. Of this $10,198.06 was appropriated and paid to various schools, and $26.67 paid out for expenses, leaving a balance of $6,638.31 in cash.

MARITIME CANAL CO. OF NICARAGUA.

Section 6 of the act of Congress approved February 20, 1889, entitled "An act to incorporate the Maritime Canal Co. of Nicaragua" (25 Stat., 675), provides:

> Said company shall make a report on the first Monday of December in each year to the Secretary of the Interior, which shall be duly verified on oath by the president and secretary thereof, giving such detailed statements of its affairs and of its assets and liabilities as may be required by the Secretary of the Interior, and any willfully false statements so made shall be deemed perjury and punishable as such. And it shall be the duty of the Secretary of the Interior to require such annual statement and to prescribe the form thereof and the particulars to be given thereby.

The report of this corporation when received will be duly transmitted to Congress. In view of the fact, however, that the Maritime Canal Co. of Nicaragua has no relations whatever with this department and the secretary has no duty to perform in relation thereto except as specified in the above-mentioned law, the act should be so amended as to require the corporation to submit directly to Congress such form of report as it may prescribe.

NEW INTERIOR DEPARTMENT BUILDING.

The act of March 4, 1913 (37 Stats., 880), provides:

> SEC. 9. That the Secretary of the Treasury be, and he is hereby, authorized and directed to cause to be constructed on square numbered one hundred and forty-three in the city of Washington, District of Columbia, a fireproof building of modern office-building type of architecture of sufficient area to afford when completed office accommodations for the entire organization at Washington, District of Columbia, of the Geological Survey, Reclamation Service, Indian Office, Bureau of Mines, and such other offices and bureaus of the Interior Department as can be accommodated therein.
>
> That the plans, specifications, and estimates for said building shall be approved by a board consisting of the Secretary of the Treasury, the Secretary of the Interior, and the Superintendent of the Capitol Building and Grounds.

In the fall of 1914, immediately after Congress made the appropriation, the drawings were started and these, together with the specifications, were completed, and proposals for the work were solicited on May 1, 1915. Contract for the complete building was entered into in July, 1915, and thereafter the work of constructing the building was carried on continuously and the building made available for occupancy during the spring of 1917.

The building has a frontage on E and F Streets NW., of 401 feet 10 inches and on Eighteenth and Nineteenth Streets NW., of 392 feet 2 inches. It is eight stories high, and its shape is the letter "E." The building is of a pleasing style of architecture, constructed of steel and hollow tile, with exterior walls of brick faced with limestone, and is fireproof. It is covered with a promenade tile roof, giving a recreation space of about 2 acres.

The total area of the basement is 104,340 square feet; that of the first story a little more than 106,000 square feet, and the upper stories have approximately 75,000 square feet each, making the total floor space of upward of 685,000 square feet, or 16 acres. The site on which the building is located is open and the plan of construction followed has been such as to provide ample air space adjacent to practically all the rooms. The basement is surrounded by area ways and there are two courts between the wings.

The west court of the building is used as a library for the Geological Survey and has a capacity of 250,000 volumes in addition to cases for maps and offices for librarian, clerks, etc.

In the east court is an auditorium, equipped with 319 leather-covered opera chairs, with stage, retiring rooms, operating rooms for motion pictures, etc. At the south of the auditorium is the pressroom where the map printing of the Geological Survey is executed. On the top of this wing is one of the largest photographic laboratories in the United States, complete with dark rooms, etc.

Special rooms are provided for the chemical, analytical, physical, petroleum, and mineralogical laboratories of the several bureaus in the building.

There are 1,500 room units in the building, 14 by 20 feet each, making about 1,280 rooms; and for daytime lighting there are about 4,244 windows. The building contains 52 toilets and 830 lavatories, each supplied with hot and cold water, and there are 96 drinking water fountains in the corridors in addition to lavatory fountains. The building is heated by direct radiation, and is supplied with electric power and light. The appropriations for the building and approaches aggregated $3,192,000.

The work of moving the Office of the Secretary, the Office of the Solicitor, the General Land Office, the Office of Indian Affairs, the United States Geological Survey, the Bureau of Mines, and the National Park Service from their former quarters to the new Interior Department Building was begun in April of 1917 and completed on June 23, 1917, at a total cost of $40,430.91. The old General Land Office Building, which had been occupied by the General Land Office, was placed at the disposal of the Secretary of War, and since the spring of 1917 has been occupied by several branches of the War Department. The Interior Department provides all the services for the building, such as charwomen, janitors, elevator conductors, and watchmen, and maintains a general power plant therein which heats, lights, and supplies power not only to that building but to the District courts and the Court of Appeals of the District of Columbia buildings, the Pension Office and Patent Office Buildings, as well as the Busch Building, on E Street NW. between Seventh and Eighth Streets, occupied by a branch of the Department of Agriculture, and the building formerly occupied by the United States Reclamation Service at the northwest corner of Eighth and E Streets NW. The work of removing the Reclamation Service from its former quarters at the corner of Eighth and E Streets NW. to the new Interior Department Building was commenced on October 17, 1918, and completed October 23, 1918.

APPENDIX A.

LAND CLASSIFICATION.

Land classification, with progress of coal classification and valuation.

STATUS ON JULY 1, 1917.

State.	Withdrawals outstanding.	Coal lands classified and appraised.	Valuation.	Valuation at minimum price.
	Acres.	*Acres.*		
Arkansas	....	60,715	$1,473,762	$1,214,280
Arizona	141,945	....	....	....
California	17,643	7,720	585,086	154,404
Colorado	4,503,417	2,877,487	196,091,022	51,370,830
Idaho	338,452	2,113	51,824	42,260
Montana	10,912,569	5,506,779	129,698,998	108,437,048
Nevada	83,833	5,880	117,600	117,600
New Mexico	5,603,894	657,145	15,682,664	7,831,453
North Dakota	14,656,455	2,375,992	37,623,645	37,623,645
Oregon	4,361	6,875	121,651	85,800
South Dakota	....	250,123	2,758,587	2,758,567
Utah	5,326,256	1,057,450	44,325,419	14,311,487
Washington	827,198	1,060	22,400	21,200
Wyoming	2,437,723	7,448,096	385,436,687	112,334,977
Total	44,853,741	20,257,435	812,989,345	336,356,608

STATUS ON JULY 1, 1918.

State.	Withdrawals outstanding.	Coal lands classified and appraised.	Valuation.	Valuation at minimum price.
Arkansas	....	60,715	$1,473,762	$1,214,280
Arizona	141,945	....	....	....
California	17,643	7,720	585,086	154,404
Colorado	4,498,376	2,881,374	196,522,340	51,483,754
Idaho	4,761	4,608	89,624	79,060
Montana	10,612,112	5,782,216	137,365,386	121,469,318
Nevada	83,833	5,880	117,600	117,600
New Mexico	5,586,244	665,565	16,349,351	8,029,868
North Dakota	14,232,501	11,409,789	199,382,666	208,518,259
Oregon	4,361	7,195	128,061	95,299
South Dakota	....	244,874	2,711,462	2,711,462
Utah	5,314,075	1,069,631	45,088,853	14,560,647
Washington	824,074	1,866	38,520	37,330
Wyoming	2,437,563	7,238,515	387,802,633	103,386,785
Total	43,757,488	29,379,948	987,655,344	511,858,066

Withdrawals and restorations.

OIL LAND.

State.	Withdrawals outstanding July 1, 1917.	Fiscal year ended June 30, 1918.		Withdrawals outstanding July 1, 1918.
		Withdrawals.	Restorations.	
	Acres.	*Acres.*	*Acres.*	*Acres.*
Arizona	230,400			230,400
California	1,257,229			1,257,229
Colorado	87,474			87,474
Louisiana	467,030			467,030
Montana	1,346,105			1,346,105
North Dakota	84,894			84,894
Utah	1,952,326	10,461		1,962,787
Wyoming	923,182	160,835	117	1,083,900
Total	6,348,640	171,296	117	6,519,819

PHOSPHATE LAND.

Florida	119,737			119,737
Idaho	966,377	49,340		1,015,717
Montana	119,227	198,690	30,034	287,883
Utah	302,465			302,465
Wyoming	998,592			998,592
Total	2,506,398	248,030	30,034	2,724,394

POTASH LAND.

California	91,207			91,207
Nevada	39,422			39,422
Total	130,629			130,629

MINERAL LAND.

Arizona	8,507			8,507

OIL SHALE LAND—NAVAL OIL SHALE RESERVES.

Colorado	45,440			45,440
Utah	86,584			86,584
Total	132,024			132,024

Oil shale classification.

OUTSTANDING OIL SHALE CLASSIFICATION JULY 1, 1918.

State.	Mineral.	Nonmineral.
Colorado	896,018	
Utah	2,635,915	4,744
Wyoming	460,103	
Total	3,992,036	4.744

Metalliferous classification.

[Northern Pacific Railroad grant lands, Idaho and Montana.]

	Classified prior to July 1, 1917.	Classified during fiscal year 1917-18.	Classified July 1, 1918.
	Acres.	*Acres.*	*Acres.*
Mineral	224,218	....	224,218
Nonmineral	334,634	160	334,794
Total	558,852	160	559,012

Miscellaneous classifications.

MINERAL AND NONMINERAL LAND.

[Lands chiefly in present and former Indian reservations.]

	Classified prior to July 1, 1917.	Classified during fiscal year 1917-18.	Classified July 1, 1918.
	Acres.	*Acres.*	*Acres.*
Mineral	185,937	3,235	189,172
Nonmineral	7,026,352	367,979	7,394,331
Total	7,212,289	371,214	7,583,503

OIL LAND.

Montana	42,097	....	42,097

PHOSPHATE LAND.

Idaho	4,080	....	4,080
Wyoming	20,576	....	20,576
Total	24,656	....	24,656

Classification of oil-shale land, fiscal year 1917-18.

State.	Outstanding July 1, 1917.		Classified during fiscal year.		Outstanding July 1, 1918.	
	Mineral.	Nonmineral.	Mineral.	Nonmineral.	Mineral.	Nonmineral.
Colorado	896,018	....	....	....	896,018	....
Utah	2,635,915	4,744	....	....	2,635,915	4,744
Wyoming	460,103	....	....	....	460,103	....
Total	3,992,036	4,744	....	....	3,992,036	4,744

Power sites withdrawn, restored to entry, and outstanding, fiscal year 1917–18, in acres.

State.	Withdrawals outstanding July 1, 1917.	Fiscal year ended June 30, 1918.		Withdrawals outstanding July 1, 1918.
		Withdrawals.	Restorations.	
	Acres.	*Acres.*	*Acres.*	*Acres.*
Alabama	120			120
Alaska	69,300	12,235	520	81,015
Arkansas	22,354			22,354
Arizona	300,324	44		300,368
California	264,006	13,217		277,223
Colorado	276,504	10		276,514
Idaho	262,494	3,315	342	265,467
Michigan	1,240			1,240
Minnesota	12,309			12,309
Montana	164,297	195	80	164,412
Nevada	27,361			27,361
Nebraska	761			761
New Mexico	62,602			62,602
Oregon	317,318	105,414	760	421,972
Utah	447,424	204		447,628
Washington	113,780	281	528	113,533
Wyoming	86,903	2,590		89,493
Total	2,429,097	137,505	2,230	2,564,372

Public water reserves.

State.	Withdrawals outstanding July 1, 1917.	New withdrawals, 1917–18.	Restorations, 1917–18.	Withdrawals outstanding July 1, 1918.
	Acres.	*Acres.*	*Acres.*	*Acres.*
Alaska	(1)			(1)
Arizona	12,438	628		13,066
California	52,474			52,474
Colorado	480			480
Idaho	7,210			7,210
Montana	3,304	1,960		5,264
Nevada	4,336	417		4,753
New Mexico	2,286	640		2,926
Oregon	2,482			2,482
Utah	33,827	1,080	280	34,627
Washington	40			40
Wyoming	82,831	31	1,550	81,312
Total	201,708	4,756	1,830	204,634

[1] Not known.

Reservoir-site reserves.

State.	Withdrawals outstanding July 1, 1917.	Fiscal year ended June 30, 1918.		Withdrawals outstanding July 1, 1918.
		Withdrawals.	Restorations.	
	Acres.	*Acres.*	*Acres.*	*Acres.*
Arizona	23,040			23,040
Colorado		1,728		1,728
Montana	9,080			9,080
North Dakota	1,569			1,569
Oregon	10,619			10,619
Washington	35,943			35,943
Total	80,251	1,728		81,979

Enlarged homestead designations, fiscal year 1917-18.

State.	Outstanding July 1, 1917.	Designations during 1917-18.	Cancellations during 1917-18.	Outstanding July 1, 1918.
	Acres.	*Acres.*	*Acres.*	*Acres.*
Arizona	25,339,047	128,596		25,467,643
California	7,212,448	345,425		7,557,873
Colorado	26,960,493	904,701	720	27,864,474
Idaho:				
Sections 1-5 only	10,042,677	311,126	290,828	10,062,974
Section 6	124,909	387,928		512,837
Total	10,167,586	699,053	290,828	10,575,811
Kansas	468,139	41,696		509,834
Montana	49,520,245	858,066	246	50,378,065
Nevada	46,301,752	3,004		46,304,756
New Mexico	28,748,456	1,256,540	16,563	29,988,434
North Dakota	11,495,203	136,182		11,631,385
Oregon	17,996,794	155,730	1,606	18,150,919
South Dakota	15,485,989	162,887		15,648,876
Utah:				
Sections 1-5 only	7,486,323	51,396	35,898	7,501,820
Section 6	1,333,369	91,305	400	1,424,274
Total	8,819,691	142,701	36,298	8,926,094
Washington	5,447,144	116,794		5,563,938
Wyoming	21,670,874	209,706	98,824	21,781,756
Total	275,633,861	5,161,080	445,083	280,349,858

NOTE.—A set of State maps showing the areas covered by the designations outstanding June 30, 1918, has been printed.

Summary of stock raising designations, fiscal year 1917-18.

[No designations prior to July 1, 1917.]

State.	Outstanding July 1, 1918.	State.	Outstanding July 1, 1918.
Colorado	1,432,766	North Dakota	190,797
Kansas	15,384	South Dakota	1,156,229
Montana	55,538	Wyoming	2,460,902
Nebraska	38,648		
New Mexico	2,188,698	Total	7,538,962

APPENDIX B.

National parks administered by the National Park Service—National Park statistics.

[Number, 16; total area, 9,774 square miles; chronologically in order of creation.]

Name.	Location.	When established.	Area (miles).	Special characteristics.
Hot Springs Reservation.	Arkansas	Apr. 20, 1832	1½	46 hot springs possessing curative properties—Many hotels and boarding houses—20 bathhouses under public control.
Yellowstone	Wyoming, Montana, and Idaho.	Mar. 1, 1872	[1] 3,348	More geysers than in all the rest of world together—Boiling springs—Mud volcanoes—Petrified forests—Grand Canyon of the Yellowstone, remarkable for gorgeous coloring—Large lakes—Waterfalls—Vast wilderness inhabited by deer, elk, bison, moose, antelope, bear, mountain sheep, etc.—Greatest wild bird and animal preserve in world.
Sequoia	California	Sept. 25, 1890	252	The Big Tree National Park—12,000 sequoia trees over 10 feet in diameter, some 25 to 36 feet in diameter—Towering mountain ranges—Startling precipices.
Yosemite	do	Oct. 1, 1890	1,125	Valley of world-famed beauty—Lofty cliffs—Romantic vistas—Waterfalls of extraordinary height—3 groves of big trees—Large areas of snowy peaks—Waterwheel Falls.
General Grant	do	do	4	Created to preserve the celebrated General Grant Tree, 35 feet in diameter—6 miles from Sequoia National Park.
Mount Rainier	Washington	Mar. 2, 1899	324	Largest accessible single peak glacier system—28 glaciers, some of large size—48 square miles of glacier, 50 to 500 feet thick—Wonderful subalpine wild-flower fields.
Crater Lake	Oregon	May 22, 1902	249	Lake of extraordinary blue in crater of extinct volcano, no inlet, no outlet—Sides, 1,000 feet high.
Wind Cave	Dakota	Jan. 9, 1903	7	Well known by reason of a cavern therein having many miles of galleries and numerous chambers of considerable size containing many peculiar formations.
Platt	Oklahoma	July 1, 1902 Apr. 21, 1904	1⅓	Many sulphur and other springs of medicinal value, under Government regulation.
Sullys Hill	Dakota	Apr. 27, 1904	1¼	Small rugged hill containing prehistoric ruins—Practically a local park.
Mesa Verde Boundary changed.	Colorado do	June 29, 1906 June 30, 1913	77	Most notable and best preserved prehistoric cliff dwellings in United States, if not in the world.
Glacier	Montana	May 11, 1910	1,534	Rugged mountain region of unsurpassed Alpine character—250 glacial-fed lakes of romantic beauty—60 small glaciers—Peaks of unusual shape—Precipices thousands of feet deep—Sensational scenery.
Rocky Mountain Boundary changed.	Colorado do	Jan. 26, 1915 Feb. 14, 1917	397½	Heart of the Rockies—Snowy range, peaks 11,000 to 14,250 feet altitude—Remarkable records of glacial period.
Hawaii	Hawaiian Islands.	Aug. 1, 1916	118	Three separate areas: 2—Kilauea, continuously active for century, and Mauna Loa, altitude 13,675 feet (largest active volcano in world, erupting every decade)—are on Hawaii; Haleakala, on Maui, 10,000 feet high, with tremendous rift in summit 8 miles across and 3,000 feet deep; many cones, gorgeous tropical forests, mahogany groves, and lava caves; erupted 200 years ago.
Lassen Volcanic	California	Aug. 9, 1916	124	Only active volcano in United States proper—Lassen Peak, 10,465 feet in altitude—Cinder Cone, 6,879 feet—Hot springs—Mud geysers—Ice caves—Canyons—Lakes.
Mount McKinley	Alaska	Feb. 26, 1917	2,200	Highest mountain in North America—Altitude 20,300 feet—Rises higher above sourrounding country than any other mountain in world.

[1] In Wyoming, 3,114 square miles; in Montana, 198 square miles; in Idaho, 36 square miles.

National monuments administered by the National Park Service.

[Number, 24; total area, 1,939 square miles; chronologically in order of creation.]

Name.	Location.	Date of proclamations.	Area (acres).	Description.
Devils Tower	Wyoming	Sept. 24, 1906	1,152	Remarkable natural rock tower, of volcanic origin, 1,200 feet in height.
Montezuma Castle	Arizona	Dec. 8, 1906	[1] 160	Prehistoric cliff-dwelling ruin of unusual size situated in a niche in face of a vertical cliff. Of scenic and ethnological interest.
El Morro	New Mexico	....do June 18, 1917	240	Enormous sandstone rock eroded in form of a castle upon which inscriptions have been placed by early Spanish explorers. Contains cliff-dweller ruins. Of great historic, scenic, and ethnologic interest.
Petrified Forest	Arizona	Dec. 8, 1906 July 31, 1911	25,625	Abundance of petrified coniferous trees, one of which forms a small natural bridge. Is of great scientific interest.
Chaco Canyon	New Mexico	Mar. 11, 1907	[1] 20,629	Numerous cliff-dweller ruins, including communal houses, in good condition, and but little excavated.
Muir Woods [2]	California	Jan. 9, 1908	295	One of the most noted redwood groves in California, and was donated by Hon. William Kent, Member of Congress. Located 7 miles from San Francisco.
Pinnacles	....do	Jan. 16, 1908	2,080	Many spirelike rock formations, 600 to 1,000 feet high, visible many miles; also numerous caves, and other formations.
Natural bridges	Utah	Apr. 16, 1908 Sept. 25, 1909 Feb. 11, 1916	[1] 2,740	Three natural bridges, among largest examples of their kind. Largest bridge is 222 feet high, 65 feet thick at top of arch; arch is 28 feet wide; span, 261 feet; height of span, 157 feet. Other two slightly smaller.
Lewis and Clark Cavern.[2]	Montana	May 11, 1908 May 16, 1911	160	Immense limestone cavern of great scientific interest, magnificently decorated with stalactite formations. Now closed to public because of depredations by vandals.
Tumacacori	Arizona	Sept. 15, 1908	10	Ruin of Franciscan mission dating from sixteenth century, until recent years in fair preservation, now rapidly disintegrating.
Navajo	....do	Mar. 20, 1909 Mar. 14, 1912	360	Contains numerous pueblo, or cliff-dweller ruins, in good preservation.
Zion	Utah	July 31, 1909 Mar. 18, 1918	76,800	Magnificent gorge, depth from 800 to 2,000 feet, with precipitous walls of gorgeous coloring. Of great beauty and scenic interest.
Shoshone Cavern	Wyoming	Sept. 21, 1909	210	Cavern of considerable extent, near Cody.
Gran Quivira	New Mexico	Nov. 1, 1909	[1] 160	One of the most important of earliest Spanish mission ruins in the Southwest. Monument also contains Pueblo ruins.
Sitka	Alaska	Mar. 23, 1910	[1] 57	Park of great natural beauty, and historic interest as scene of massacre of Russians by Indians. Contains 16 totem poles of best native workmanship.
Rainbow Bridge	Utah	May 30, 1910	160	Unique natural bridge of great scientific interest and symmetry. Height 309 feet above water, and span is 278 feet, in shape of rainbow.
Colorado	Colorado	May 24, 1911	13,883	Many lofty monoliths, and is wonderful example of erosion, and of great scenic beauty and interest.
Papago Saguaro	Arizona	Jan. 31, 1914	2,050	Splendid collection of characteristic desert flora and numerous pictographs. Interesting rock formations.
Dinosaur	Utah	Oct. 4, 1915	80	Deposits of fossil remains of prehistoric animal life of great scientific interest.
Sieur de Monts [2]	Maine	July 8, 1916	[1] 5,000	Mountainous area adjacent to Bar Harbor which includes 10 mountains and several lakes. Is very wild and rugged. Most romantic and beautiful mingling of mountain and ocean scenery on Atlantic coast.
Capulin Mountain	New Mexico	Aug. 9, 1916	681	Cinder cone of geologically recent formation.
Verendrye	North Dakota	June 29, 1917	253	Includes Crowhigh Butte, from which Explorer Verendrye first beheld territory beyond the Missouri River.

[1] Estimated.

[2] Donated to the United States.

National monuments administered by the National Park Service—Continued.

Name.	Location.	Date of proclamations.	Area (acres).	Description.
Casa Grande	Arizona	Mar. 2, 1889[1] Dec. 10, 1909 Aug. 3, 1918	480	These ruins are one of the most noteworthy relics of a prehistoric age and people within the limits of the United States. Discovered in ruinous condition in 1694.
Katmai	Alaska	Sept. 24, 1918	[2]1,088,000	Wonderland of great scientific interest in the study of volcanism. Phenomena exist upon a scale of great magnitude. Includes Valley of Ten Thousand Smokes.

[1] From Mar. 2, 1889, until Aug. 3, 1918, classified as a national park.
[2] Estimated.

National monuments administered by the Department of Agriculture.

[Number, 11; total area, 1,769½ square miles; chronologically in order of creation.]

Name.	Location.	Date of creation.	Area (acres).	Description.
Gila Cliff Dwellings.	New Mexico	Nov. 16, 1907	160	Numerous cliff-dweller ruins of much interest and in good preservation.
Tonto	Arizona	Dec. 19, 1907	[1] 640	Do.
Grand Canyon	do	Jan. 11, 1908	[1] 806,400	Includes the most wonderful portion of the Grand Canyon of the Colorado.
Jewel Cave	South Dakota	Feb. 7, 1908	[1] 1,280	Limestone cavern of much beauty and considerable extent, limits of which are as yet unknown.
Wheeler	Colorado	Dec. 7, 1908	300	Of much interest from geological standpoint as example of eccentric erosion and extinct volcanic action. Of much scenic beauty.
Mount Olympus	Washington	Mar. 2, 1909 Apr. 17, 1912 May 11, 1915	299,370	Contains many objects of great and unusual scientific interest, including many glaciers. Is summer range and breeding ground of the Olympic elk.
Oregon Caves	Oregon	July 12, 1909	480	Extensive caves in limestone formation of much beauty; magnitude not entirely ascertained.
Devil Postpile	California	July 6, 1911	800	Spectacular mass of hexagonal basaltic columns, like an immense pile of posts. Said to rank with famous Giant's Causeway in Ireland.
Walnut Canyon	Arisona	Nov. 30, 1915	960	Contains cliff dwellings of much scientific and popular interest.
Bandelier	New Mexico	Feb. 11, 1916	22,075	Vast numbers of cliff-dweller ruins, with artificial caves, stone sculpture, and other relics of prehistoric life.
Old Kasaan	Alaska	Oct. 25, 1916	38.3	Abandoned Indian village in which there are numerous remarkable totem poles and other objects of historical interest.

[1] Estimated.

National monuments administered by the War Department.

[Number, 2; total area, 6 acres; chronologically in order of creation.]

Name.	Location.	Date of creation.	Area (acres).	Description.
Big Hole Battle Field.	Montana	June 23, 1910	5	Site of battle field on which battle was fought Aug. 9, 1877, between a small force of United States troops and a much larger force of Nez Perce Indians, resulting in rout for the Indians.
Cabrillo	California	Oct. 14, 1913	1	Of historic interest because of discovery of the territory now partly embraced in the State of California by Juan Rodriguez Cabrillo, who at this point first sighted land on Sept. 28, 1542.

REPORT OF THE COMMISSIONER OF THE GENERAL LAND OFFICE.

Department of the Interior,
General Land Office,
Washington, September 10, 1918.

Sir: I have the honor to submit a report of the transactions of business in the General Land Office for the fiscal year ended June 30, 1918, together with my suggestions for new legislation.

AREA OF LAND ENTERED AND PATENTED.

The total area of public and Indian lands originally entered and allowed during the fiscal year ended June 30, 1918, is 9,974,331.61 acres, not including 172,446.46 acres embraced in finals not heretofore counted as original dispositions of land. This latter area is constituted as follows: Public auction, 144,595.70 acres; abandoned military reservations, 1,131.91 acres; cash and private sales, individual claimants and small holding claims, 5,964.28 acres; preemption entries, 40 acres; and soldiers' additional homesteads, 20,714.57 acres. The area of 9,974,331.61 acres is a decrease of 6,227,462.77 acres, as compared with the area originally entered and allowed during the fiscal year 1917. This heavy decrease in allowed entries is due largely to the fact that the bulk of applications under the grazing homestead act have remained suspended pending designation of the land.

The area patented during the fiscal year is 9,552,482.217 acres, a decrease of 1,760,880.023 acres, as compared with the fiscal year 1917. Of the above area, 6,492,797.816 acres were patented under the homestead laws, a decrease of 1,051,257.454 acres, not including as homesteads 20,906.54 acres patented as soldiers' additional entries.

CASH RECEIPTS AND EXPENDITURES.

The total cash receipts from the sales of public lands, including fees and commissions ($1,160,350.88), sales of reclamation townsites ($48,687.41), and sales of lands in the Oregon and California railroad grant ($161,169.77), for the fiscal year 1918 were $3,420,783.64. The total receipts from the sales of Indian lands were $1,935,773.73. Other receipts aggregated $75,270.29. The total receipts of this bureau during the fiscal year 1918 were $5,431,827.66.

The total expenses of district land offices for salaries and commissions of registers and receivers and incidental expenses during the fiscal year ended June 30, 1918, were $821,758.15. The aggregate expenditures and estimated liabilities of the public land service including expenses of district land offices and surveys made from the appropriations for surveying the public lands outside of railroad land grant limits, were $2,948,360.92, leaving a net surplus of $2,483,466.74 of receipts over expenditures. Disbursements from the following special deposit trust funds and reimbursable appropriations are not included in the above figures as receipts or expenditures: From deposits by individuals for surveying the public lands, $62,249.09; from surveying within land grants (reimbursable), $19,593.12; from opening Indian reservations (reimbursable), $10,167.37; and from surveying and allotting Indian reservations (reimbursable), $74,035.96.

THE FIELD SERVICE.

The sum made available for the Field Service for this year was the same as last year, namely, $475,000. The average number of field employees maintained under this appropriation during the year was 100, and in addition thereto the cost of maintenance of offices of the chiefs of Field Division and the clerical assistance required for them was paid from this appropriation.

The total amount of cash collected and turned into the Treasury as the result of the work of the field force during the fiscal year was $118,916.01; of this amount, $25,748.29 was in settlement of timber trespass cases, and $31,021.56 was secured from timber sales; $62,146.16 was recovered through civil and criminal action brought by the Department of Justice in cases of depredations on the public lands and violations of the public land laws. In addition there has been turned into the Treasury $8,900.46 which represents royalty on coal mined during the past year from a tract in Colorado. This tract had been patented, but title thereto was recovered through suit, and under the decree of court the lessee from those deriving title from the patentee was protected, and the Government therefore now stands, while this lease runs, in the position of lessor.

As a result of investigations by the field employees 99,038 acres have been restored during the year to the public domain. Of this amount, 93,920 acres represent fraudulent entries (taking an average of 160 acres to each entry) canceled through proceedings based upon special agents' reports; 5,118 acres were restored to open range by abatement of unlawful inclosures without suit.

Special agents have investigated and reported on 18,968 cases, 4,563 of which were adversely and 14,406 favorably reported. Two hundred and twenty-three hearings in Government contest cases have been held.

Civil suits in 70 cases were recommended to the Department of Justice as the result of investigations made during the year. One hundred and sixty civil suits were tried in court of which 93 were won and 67 lost. As the result of the successful prosecution of these suits, $55,720.16 was recovered and 157,874.95 acres were restored to the public domain, of which 153,509 had been unlawfully inclosed.

Of the criminal cases tried during the year, 32 resulted in convictions under which there were 10 prison sentences imposed and fines amounting to $6,426 paid.

Considering the constant change in personnel, the Field Service has accomplished satisfactory results. During the year there were 40 separations, 14 of our experienced men entered the military service. We have experienced difficulty in securing competent new men to take the places of those who have gone, for experience has taught us that as a general rule no man should be assigned to the Field Service until he has been thoroughly tried out in some other branch of the work.

As indicated in another part of this report, one of the very considerable additions to the work of the Field Service has been the investigation of stock driveways provided for in the stock-raising homestead act of December 29, 1916. Aside from the necessity of examination of the status of the title, as well as whether or not the driveways were practically feasible, over extensive areas there developed many contending interests and differences of opinion as to the necessity or desirability of particular driveways, as a result of which it was soon found that no intelligent or final recommendation could be made without complete information as to conditions affecting the proposed driveways.

During June, 1918, all the chiefs of field divisions, except the chief of the Alaska division, were called into Washington for a general conference, which continued systematically for the period of one week. This was the first time this had ever been done. Many important questions affecting the whole service were thoroughly considered, as well as opportunity given for consideration of particular cases. I am sure the conference was productive of much good both to this office and the Field Service.

THE EXPLORATION CASE.

On June 10, 1918, the United States Supreme Court decided the case of Exploration Co. (Ltd.) *v.* United States, in which it was held that the statute of limitations of March 3, 1891 (26 Stat., 1093), in a case of concealed fraud did not commence to run until the discovery of the fraud. The work of investigation of alleged frauds in a number of important cases which had been suspended pending decision of this case, will now be pushed to completion as rapidly as possible.

DECREASING LAND FRAUDS.

A comparison in the matter of actions taken on fraudulent entries for the last seven years develops the following figures:

In 1913, there were 2,036 cancellations of fraudulent entries; in 1914, there were 1,825; in 1915, there were 1,614; in 1916, there were 822, and in 1917 only 648, a total decrease of 68 per cent. What does this signify?

Naturally the first question that presents itself is whether or not there were fewer outstanding entries during this period; in other words, were the subsisting entries and proofs reduced to such an extent that the percentage of fraudulent cases nevertheless remained constant. As to this, reference to the annual reports for the years mentioned shows the following:

Year.	Entries allowed (exclusive of Indian lands)	
	Original.	Final.
	Acres.	*Acres.*
1913	[1] 15,321,000	11,450,000
1914	15,925,000	10,676,000
1915	16,183,000	8,[illegible],000
1916	17,414,000	8,210,000
1917	14,802,000	9,247,000

[1] 1,697,000 acres in excess of year 1912.

These figures indicate that while there has been a slight falling off in the area covered by final proofs, up to and including 1916, there was a steady increase of new business following 1912, and much more in 1917 than in 1912. During the period from July 1, 1916, to December 31, 1916, there were 14,850 final homestead proofs; during the same period for 1917 there were over 22,000. These figures are consistent with the above table; the final proofs for 1915–16 dropped off because of the smaller amount of new business three and four years before, while in 1917 and first half of the fiscal year 1918 we find a marked increase in final proofs due to the increased new business during 1914–15–16. If the analogy continues to hold good we should have still more final proofs in 1919. No account is taken in any of these figures of operations under the grazing homestead act, and as the enlarged homestead act has been in force since 1909, it is fair to presume that the number of entries included in these items is fairly proportionate to the areas.

It is apparent, therefore, that during the years that cancellations for fraud have decreased more than half, as above stated, the outstanding, subsisting entries have increased, rendering the figures as to cancellations for fraud still more significant. What, then, is the cause? Have the moral standards of land entrymen improved; or is the Field Service less diligent; or are we less exacting in rendering decisions; or has the competition for public land become so keen that the private contestant has become a more potent force in securing compliance with the law; or have years of constant vigilance on the part of the Field Service and the knowledge of the public that they have not relaxed, brought about a greater respect for, and general compliance with, the law? While any or all of these factors may have contributed something to the result, we venture the opinion that the last two named furnish the true explanation of the marked reduction in fraud cases. The public has learned that in the long run irregular methods do not pay. Moreover, the so-called "big fraud", cases involving frequently a large number of fraudulent homestead, timber or coal entries, are almost a thing of the past; practically all such cases that are not closed had their inception years ago.

OIL LANDS.

Since a brief history of the events leading up to the oil-land controversy, together with a statement of the questions involved was given in the last annual report, only such statistics and other data as are necessary to bring this statement up to date will be given in this report.

CALIFORNIA.

The following tabulation indicates the present situation in respect to mineral applications; also unentered lands which are involved in suits by the Government, within the withdrawn areas in California.

OUTSIDE NAVAL RESERVES.

	Entries.	Acres.
Awaiting investigation	4	640.21
Awaiting office action on reported investigation	8	1,115.61
Reported but awaiting termination of adverse suits by private parties	4	640.00
Awaiting hearings on adverse charges by United States	35	8,080.96
Hearings held in last fiscal year	34	9,375.30
Awaiting decisions by register and receiver on hearings held	14	2,900.84
Pending in General Land Office or department on hearing records	9	2,243.22
Canceled in last fiscal year	24	6,945.38
Patented in last fiscal year	8	1,050.39
Clearlisted but not patented	1	80.00
Disposed of in last fiscal year	32	7,995.77
Now pending outside naval reserves	75	15,700.83
Lands in these entries also involved in suits by the Government	13	2,082.06
Unentered lands involved in suits by the Government	....	2,516.79
Lands outside naval reserves involved in suits by the Government attacking patents issued to the Southern Pacific Railroad Co	....	183,183.63

IN NAVAL RESERVE NO. 1.

Awaiting office action on reported investigations	1	160.00
Reported but awaiting termination of adverse suit by private party	1	638.96
Pending before register and receiver under private contest	1	644.48
Awaiting hearings on adverse charges by United States	7	3,089.51
Now pending in naval reserve No. 1	10	4,532.95
Lands in above entries also involved in suits by the Government	1	160.00
Unentered lands in naval reserve No. 1 involved in suits by the Government	....	160.00
Lands in naval reserve No. 1 involved in suits by the Government attacking patents issued to the Southern Pacific Railroad Co	....	10,754.54

IN NAVAL RESERVE NO. 2.

	Entries.	Acres.
Reported, but awaiting termination of adverse suits by private party	1	320.00
Awaiting hearings on adverse charges of United States	16	4,225.10
Hearings held in last fiscal year	16	2,738.59
Awaiting decisions by register and receiver on hearings held	16	2,738.59
Now pending in naval reserve No. 2	33	7,263.00
Lands in above entries also involved in suits by the Government	32	7,223.00
Unentered lands in naval reserve No. 2 involved in suits by the Government	....	800.40
Lands in naval reserve No. 2 involved in suits by the Government attacking patents issued to the Southern Pacific Railroad Co	....	15,360.00

SUMMARY.

Awaiting investigation	4	640.22
Awaiting office action on reported investigations	9	1,275.61
Reported, but awaiting termination of adverse suits by private parties	6	1,808.98
Awaiting hearing on adverse charges by United States	56	15,495.56
Hearings held in last fiscal year	50	12,112.00
Awaiting decisions by register and receiver on hearing records	30	5,690.24
Pending in General Land Office or department on hearing records	9	2,242.22
Pending in local land office under private contest	1	644.48
Canceled in last fiscal year	24	6,945.38
Patented in last fiscal year	8	1,760.30
Clear listed but not patented	1	80.00
Total disposed of during last fiscal year	32	7,906.77
Total now pending	118	27,617.38
Lands in above entries also involved in suits by the Government	47	9,465.08
Unentered lands involved in suits by the Government	....	3,477.08
Lands involved in suits by the Government attacking patents issued to the Southern Pacific Railroad Co	....	150,298.17

WYOMING.

In Wyoming additional oil withdrawals aggregating 160,835 acres were made during the fiscal year and 117 acres restored as nonoil. On June 30, 1918, 1,053,900 acres were embraced within existing withdrawals. In the withdrawn area one entry of 40 acres was patented and two applications embracing 480 acres were rejected. Five new applications embracing 800 acres were filed. At the end of the fiscal year 61 applications for patent embracing approximately 9,500 acres were pending.

Two new suits embracing 400 acres were instituted during the year involving lands not covered by applications for patent. Operations are being conducted on one 80-acre tract so involved, under an arrangement whereby the proceeds from the sale of the oil, less a fixed amount per barrel deducted for operating expenses, are being deposited in escrow pending the outcome of the suit. One suit covering 160 acres is pending and hearing on adverse proceedings brought against the application for patent involved has been held. The land is being operated and a portion of the proceeds from the sale of the oil is being deposited in escrow, under a stipulation with the Department of Justice pending the outcome of the suit.

OIL CONTRACTS.

At the end of the fiscal year there were 45 contracts under the act of August 25, 1914 (38 Stat., 708), pending in California, embracing approximately 4,430 acres. This includes nine supplemental contracts providing for the disposition of proceeds impounded prior to the entering into of the original contracts. The production from the tracts covered by these contracts up to June 30, 1918, was 6,405,686.29 barrels of crude oil, 572,393,078 metered feet of dry gas, and 529,128 gallons of gasoline; and the escrow deposits thereunder amount to $653,571.32.

In Wyoming 36 such contracts, covering approximately 3,880 acres, all in the Salt Creek field, are pending. In five of these surety bonds covering an agreed maximum liability have been filed in lieu of deposits in escrow. The production under these contracts to June 30, 1918, was 8,270,595.82 barrels.

Two 40-acre tracts in the Grass Creek field which are being operated under State leases are not included in mineral applications. In consequence, these tracts could not be included in contracts under the act of August 25, 1914, but an understanding has been entered into providing for the impounding of the gross proceeds of production, less a certain amount allowed for operating expenses. The production from these tracts to the end of the fiscal year was 980,308.14 barrels, and the escrow arising from the sale of the oil produced amounted to $1,357,221.41.

The total production in Wyoming under these various agreements to June 30, 1918, was 9,250,903.96 barrels and the escrow deposits or equivalent (surety bonds) amounted to $2,838,073.58. To the end of the fiscal year the total production in both California and Wyoming under these agreements was 15,656,590.25 barrels and $3,491,544.90 escrow deposits.

Under arrangements with the operators both in California and Wyoming, $647,600 of the escrowed funds were invested in second Liberty bonds and $960,050 in third Liberty bonds, which with the $507,200 theretofore invested in Liberty bonds of the first issue makes a total of $2,114,850 so invested.

With the exception of one tract involved in suit where operations are being conducted under an arrangement between the operator and the Department of Justice, which arrangement is in the nature of a receivership, all production on unpatented lands within the withdrawn area in the Salt Creek field is being conducted under permits under the act of August 25, 1914.

STATUS OF PROCEEDINGS.

As will be seen from the foregoing a considerable number of the applications for patent, against which adverse proceedings instituted by the Land Department are pending, are also involved in suits filed by the Department of Justice on the same issues. Action on these proceedings was, for a time, held suspended to await judicial determination by the courts of the questions in issue, to the end that this department might be guided in its deliberations by the findings of the courts in these cases, as well as to avoid, if possible, double trials on substantially the same issues.

This course was encouraged by a decision handed down by the United States District Court for the Southern District of California, rendered in October of 1916, in the Devils Den Consolidated Oil Co.'s case, in which it was held that the courts have jurisdiction to try the case on its merits, on proper charges, notwithstanding the fact that an application for patent was, at the time, pending for determination before the Interior Department; but hearings were set and held in such cases, not involved in suits, as could be reached. This work, however, has been considerably hampered by various causes, among which are illness of attorneys, inability to locate important witnesses, and the absence of interested parties or important witnesses by reason of their service in France and elsewhere in connection with the present war. Only recently the United States circuit court of appeals for the ninth circuit, has reversed the lower court in the following words:

> Nothing in our public land laws is more firmly settled than that the sale and disposal of the public lands has been placed by statute under the control of the Land Department, at the head of which is the Secretary of the Interior, and which includes a bureau headed by the Commissioner of the General Land Office, to whom, as a special tribunal with quasi judicial powers, Congress has conferred the execution of the laws which it has enacted for the sale and disposal of the various kinds of public lands. It was said in Cosmos Exploration Co. *v.* Grey Eagle Oil Co. (104 Fed., 40), no court can lawfully anticipate what the decision of that department may be in respect to any contest arising before it, nor direct in advance what its decision shall be even in matters of law, much less in respect to matters of fact. After, however, the proceedings in the Land Department have come to an end by the issuing of the Government title, the courts are open for the control of such title, either by the Government, in the event that its title has been procured either by fraud or in any other illegal way, or at the suit of any private party equitably entitled thereto, is established by almost innumerable decisions.

The court also held that, based upon a sufficient bill, a court of equity has the power to appoint a receiver pending determination of title by the Land Department and in a proper case it will be its duty, acting on such a bill, to exercise that power, but in the case before it no allegation and not even a reference regarding proceedings in the Land Department respecting the lands is made.

The case was remanded with instructions to permit the bill to be amended, on failure of which it will be dismissed.

This appears to necessitate the amending of the bills so as to make the court cases merely ancillary proceedings to those of the Land Department, for the purpose of having receivers appointed pending trial of the case. In most of the cases involved in suits receivers have already been appointed, and the claimants have been allowed to continue their operations under direction of the court but are required to impound all the proceeds, after deducting the costs of operations, pending final decision.

In addition to the 50 hearings completed during the year as indicated in the above table, all or part of the Government's testimony has been put in in 12 or 15 cases, and 27 cases have been set for trial in the next six or eight months. There are, however, 7 cases still held under suspension at request of the Special Assistant to the Attorney General to await the trial of the court cases involving the same land and the same issues.

FULLER'S EARTH CASES.

At the time of the first withdrawal and the reservation of the land in naval reserve No. 1, a considerable part of the unpatented land therein was held by mineral claimants under alleged discovery of deposits of fuller's earth, a clayey substance used for the clarification of mineral and vegetable oils. After thorough tests by the United States Bureau of Mines and a careful field investigation, these claims were attacked by adverse proceedings on the ground that no discovery of valuable minerals had been made; that the claim that valuable deposits of fuller's earth had been discovered was a mere subterfuge made for the purpose of acquiring title to valuable oil lands; and that the claimants were not at the date of withdrawal engaged in the diligent prosecution of work leading to the discovery of oil or gas upon the land in question. That these issues might be tried out in the courts, the Department of Justice filed a suit in one of the cases, and a mineral inspector of this office was detailed to assist that department by making further investigations and further tests of the material for the purpose of qualifying as a witness for the Government. Action on the remaining cases was held in abeyance pending the trial of this case. In view, however, of the court decision above quoted, it now devolves upon this department to try these cases, and an effort is being made to bring them to early trial.

SUBSTITUTION OF NAVY'S PROTESTS.

In a number of cases embracing lands in naval reserve No. 2, against which suits have been filed, the suits have been dismissed without prejudice and ancillary suits filed, or the bills have been amended to make the suits ancillary to the Land Department proceedings. Coincident with this action the Navy Department filed charges and requested that hearings be ordered, after due notice, at which the Navy Department, by its solicitor, or by counsel assigned by the Attorney General, might introduce testimony. Again to avoid double hearings between the same parties on the same issues, the proceedings instituted by this office were suspended and proceedings based upon the charges filed by the Navy Department were ordered. These proceedings included 12 mineral applications by the Honolulu Consolidated Oil Co. against which no adverse charges have been preferred by this department, and 4 against which adverse charges had been preferred and the hearings completed; also, 11 mineral applications filed by J. M. McLeod or the J. M. McLeod Co., all of which are predicated upon the so-called McMurtry locations, all of which were pending under charges by this department. The hearings on the Honolulu cases have been completed, but during the time covered by this report the record of the hearings had not been received in the General Land Office. Trial of the remaining cases covered by the Navy's petition is now awaiting convenience of that department.

"FERRY" OR "CADDO LAKE" OIL LANDS IN LOUISIANA.

During July and August, 1917, 18 suits were instituted on behalf of the Government in the United States District Court, Western District of Louisiana, involving the "Ferry" or "Caddo Lake" oil lands. This oil field first received attention about 10 years ago when a letter was written to the President stating that there was a wild gas well in the Caddo field and complaining of the enormous waste of natural gas without any apparent effort to prevent it. It was alleged that the annual waste of the gas in that field was equal to one-twentieth of the total amount of natural gas annually consumed in the United States. The matter was referred to the Director of the Geological Survey, as a result of which an investigation was made and all of the public lands within that vicinity were withdrawn by a blanket withdrawal December 15, 1908. On July 2, 1910, Louisiana petroleum reserve No. 4 was established by order of the President.

The discovery of gas was followed by a rush of persons desirous of obtaining the public lands by location under the United States mining laws, and several hundred such locations were made within a short time. The value of the lands, which previously was considered to be merely nominal, suddenly became greatly enhanced.

The first step that led to the institution of the above referred to suits was initiated by the filing in this office December 8, 1909, of an application for the survey of a portion of the bed of "Ferry" or "Caddo Lake." The history of the progress of the case while it remained within the jurisdiction of the Land Department has been related in previous annual reports. The institution of the suits marks the beginning of the final step of this important matter.

These actions are suits in equity to quiet title in the Government to approximately 617 acres of oil-producing lands and to recover the value of the oil extracted therefrom. The lands do not comprise one contiguous area, but consist of numerous tracts that border on the mean high water mark of the lake. It is alleged in the bills of complaint that the title to these lands has always been in the Government and that large quantities of oil have been illegally extracted. It appears from the pleadings that 33 oil wells, of which 23 are still producing, and 1 gas well are involved in the suits, and approximately 1,300,000 barrels of oil have been extracted from these wells. The Government alleges that the value of that oil at the time of extraction is approximately $645,000. The defendants contend that if they are liable they were innocent trespassers, and they have filed large counterclaims covering the alleged costs of production and operation.

The suits came up for trial before the district judge during the latter part of February of the present year, and motions to dismiss all of the suits were filed on behalf of the defendants, including one suit involving the question of the confirmation of a homestead entry initiated prior to the date of issuance of the first withdrawal order. The court overruled the motions in all of the suits except the one involving the homestead entry, and it still has that case under advisement.

A special master in chancery was appointed to hear the testimony and submit to the court his recommendations. The testimony was recently taken in 17 of the suits. The records are somewhat voluminous, but decisions are expected at an early date. Much interest surrounds the adjudication, and appeals will doubtless be taken regardless of the findings of the district court.

In some of the suits the defendants are contending that the Government does not own the lands for the reason that the originally unsurveyed lands passed as an incident of riparian ownership when it parted with the title to the adjoining surveyed lands. In others the title to the lands is admitted to be in the Government, but the defendants are contending that they have been operating under valid placer mining claims. They further admit in most instances that those claims were initiated between the dates of issuance o the two withdrawal orders.

The Caddo oil field is located in northwestern Louisiana, about 25 miles northwest of Shreveport. It is a comparatively narrow field, extending for about 10 miles in a northwesterly and southeasterly direction. Recently new discoveries have been made which may indicate that the oil-producing area is more extensive than originally supposed. This field is now considered one of the rich oil fields of the southeastern part of the United States. The Government's interests, however, are limited to a few isolated tracts, as nearly all of the lands within the known area of oil production were patented long prior to the discovery of oil.

"SUNK LANDS" AND "LAKE LANDS" IN ARKANSAS.

The position of the Government in the long-pending "sunk land" suits was fully upheld when, on November 5, 1917, the United States Supreme Court rendered its decision in the suit of Lee Wilson & Co. *v.* United States, sustaining every contention, both of law and of fact, raised by the Land Department at the time that it asserted title to the numerous unsurveyed areas in northeastern Arkansas. The litigation has been followed with keen interest since the suit was first instituted in the United States district court August 4, 1911, owing to the fact that the adjoining lands were surveyed between 70 and 80 years ago, and that the title to all of those lands passed beyond the control of the Government about 60 years ago. The suits impleaded as defendants two classes, riparian claimants, resting their claims of title to the beds of the "lakes" upon the theory of recession and gradual accretion, and transferees of the St. Francis levee board basing their defense upon the alleged legal effect of the so-called "donation act" of 1893. Private litigation involving the title to these lands had been carried three times to the highest State and Federal courts, but it was realized that final adjudication could not be had until the United States became the plaintiff and prosecuted the suits to a conclusive determination. The defendants, in addition to the contention of law raised on their behalf, also pleaded long standing equitable claims, and their claims to equities had perhaps been considerably strengthened by virtue of the fact that for a period of a half century the Government had consistently refused to take steps to assert title and had even gone so far as to declare in two separate departmental decisions that the Government had no interest in the unsurveyed areas.

It had been long acknowledged by all parties in interest that the suit of Lee Wilson & Co. *v.* United States, supra, was a test case and that its outcome would be determinative of the issues of law involved in all the Arkansas "sunk land" and "lake land" cases. The Government had, however, after obtaining a favorable decision from the United States district court, proceeded to institute separate suits involving the so-called "sunk lands" proper, an area of approximately 55,000 acres extending a distance of nearly 40 miles along the St. Francis River and so-called Big, Brown, Buford, Carson, Clear, Flat, Grassy, Hickory, Round, Tyronza, and Walker Lakes, comprising upwards of 50,000 acres. Favorable decrees had been handed down by the district court in five of those suits, the suits involving so-called Buford, Clear, Flat, Grassy, and Walker Lakes, prior to the rendition of the Supreme Court decision in the test case, conditional, however, to vacation or modification upon the result of the Supreme Court findings. Since November 5, 1917, the desire of most of the adverse claimants to effect settlement has been very conspicuous, and a great amount of the pending litigation has been terminated by the entering of consent decrees. This has been done in the suits involving so-called Buford, Carson, Clear, Flat, Grassy, Hickory, Round, Tyronza and Walker Lakes and also with respect to about one-third of the so-called "sunk land" area proper. By the terms of those decrees the title to the lands becomes quieted in the Government. It is expected that all of this litigation will be successfully terminated during the forthcoming fiscal year.

The 100,000 acres of so-called "sunk lands" and "lake lands" in the St. Francis River Basin and along the Mississippi River front are among the most valuable agricultural lands in the State of Arkansas, and it is probably safe to say that those lands are now conservatively worth not less than $5,000,000. With the improved drainage conditions that are being effected by the local drainage districts the lands will continue to increase in value for a long time to come.

During the time that the adverse claimants were in undisputed possession of the lands in so far as the Government was concerned, large quantities of merchantable timber were removed and sold. Subsequent to January 1, 1918, the Government has recovered through compromise settlements the aggregate sum of $36,376.90, which has been accepted and covered into the United States Treasury. Certified checks have also been received for the aggregate amount of $15,031.49, in proposed settlements in timber trespass cases on the above referred to lands upon which action has not yet been taken by this office. The sum of $2,432.21 has also been paid by trespassers to certain settlers who were residing upon the lands at the time that the timber of that value was cut, and who have since earned the right to receive patent for the lands. Inasmuch as the timber in most instances was cut prior to the time that the Government asserted title to the lands and by parties who were in good faith claiming pursuant to some color of title, most of the above referred to settlements were made and accepted on the basis of innocent trespass.

Nearly all of the so-called sunk lands and lake lands in northeastern Arkansas the title to which has been asserted by the Government have been entered under the homestead laws. In many instances the entrymen have resided upon the lands for a number of years and have made valuable improvements. Large areas have been reduced to a high state of cultivation, and crops of corn, cotton, and alfalfa are being raised. At the time that the suits to quiet title were instituted it was decided to withhold the issuance of final certificates and patents until the question of title could be finally adjudicated by the courts. Now that final decrees have been entered in a number of suits, the suspension affecting the lands involved in those suits will be vacated and patents will be issued to those entrymen who appear to be entitled to receive them. Lands representing a considerable percentage of the above-referred-to areas will doubtless pass into private ownership during the next fiscal year.

On November 5, 1917, and December 31, 1917, decisions were rendered in cases involving the question of title to unsurveyed areas locally known as "Carters" or "Crater Lake" and "Youngs Lake," comprising areas of approximately 1,500 acres and 2,000 acres, respectively, situated in T. 13 N., R. 9 E., and T. 11 N., R. 10 E., fifth principal meridian, Arkansas. Surveys of those areas have been ordered. The field survey of "Golden Lake" and "Swan Lake" was completed during the fall and early winter of 1917, and "Carters" and "Youngs" lakes would have been surveyed also had not unusually severe climatic conditions prevented further pursuance of field work. A few cases involving the question of title to so-called lakes in Arkansas are pending for action before this office and new cases of similar character are occasionally being presented.

On November 17, 1917, this office rendered a decision in an important land case involving an area of approximately 3,000 acres locally known as "Musgrave Bar," situated opposite fractional T. 15 N., R. 13 E., Arkansas. An application for the survey of the bar had previously been presented on behalf of settlers. It was held that the evidence appeared to establish the fact that the lands had formed first as a sand bar or towhead on the bed of the Mississippi River subsequent to the date of the admission of the State into the Union and had by process of accretion gradually increased in size until it became a part of the mainland and that the title thereto had become vested in the State of Arkansas by virtue of its sovereignty. Subsequently a suit was instituted in the United States district court by parties claiming title through the State and that court held that the title had vested in the State or its grantees.

On July 27, 1916 (39 Stat., 409), Congress included in the rivers and harbors appropriation an item for the purpose of making a preliminary examination and survey with a view to ascertaining the practicability of improving the St. Francis River sunk lands in the States of Arkansas and Missouri and of incidentally reclaiming by drainage the contiguous lands. On April 13, 1917, an Executive order was issued withdrawing all of the then vacant public lands within the sunk-land area in the former-mentioned State. The rivers and harbors appropriation act of August 8, 1917 (ch. 49, 40 Stat., 250), included an appropriation for various examinations and surveys. In the list was included an instrumental survey with a view to preparing plans and estimates of cost for caring for flood waters of Black River and to determining whether a portion of the flood waters of the St. Francis River should be diverted to the Black River.

On April 26, 1918, a bill (H. R. 11715), was introduced in the House of Representatives, proposing to authorize the local drainage districts to include within their projects the unreserved public lands within the area of so-called Big Lake and also certain public lands within the St. Francis sunk-land area and to subject said lands to local taxation in like manner as privately owned lands. A companion bill was subsequently introduced in the Senate.

The work with reference to the question of ascertaining whether or not areas that were originally meandered as lakes comprise public lands is by no means confined to the State of Arkansas. Cases of erroneous or fraudulent surveys have been found in other States, and this class of work forms an important branch of land-office procedure.

SURVEYS.

The area of accepted surveys and resurveys during the fiscal year amounts to something over 11,000,000 acres, which is 1,000,000 more than the area accepted during the previous year and is the same as the area patented during the year 1917. It is the third largest output for the last six years and is the average annual production for the four years, 1915, 1916, 1917, and 1918.

The examination of surveyors' returns, which preceded the acceptance of surveys and filing of plats for entry, has been hampered by the diminution of the force of examiners, caused by war exigencies. The result is shown in the increase of arrears. Surveys received are obliged to wait at least six months before being reached for consideration and final tests here. It is expected, however, that the force of examiners will be augmented during the coming winter by a number of field surveyors who will assist in the final tests given here, so there can hardly be any doubt that the current fiscal year will see the accumulated arrears entirely removed. Congress has especially made provision for this in the sundry civil appropriation act. It is confidently believed that with the arrears disposed of the force of examiners, if slightly increased, will be able to handle all surveys as soon as they reach this office.

NEW MEXICO-COLORADO BOUNDARY LINE.

A resurvey and reestablishment of the corners along the original New Mexico-Colorado boundary line in the vicinity of Edith and Ewell Canyon was made for a distance of some 38 miles, to be used as the basis for the future determination of the rights of individuals as related to the surveys under which such rights were acquired, for the accomplishment of which instructions have duly issued.

The principle was adopted, as held by this office in 1902, that—

> notwithstanding the different locations of the monuments which were supposed to have been established upon the thirty-seventh parallel of latitude, this office is of the opinion that for all administrative purposes, the line established by E. N. Darling in 1868, wherever its location can be identified beyond a reasonable doubt, should be recognized as the boundary line,

and it was accordingly held that the current survey would control in all matters of public land surveys and administration.

The State authorities of the two jurisdictions have been furnished with a statement of the matters involved in the resurvey, and it has been suggested that if the legislatures of the States would formally approve and adopt the Darling line as the boundary it would put an end to a troublesome controversy of long standing which is of more theoretical than practical importance.

THE MANUAL.

The first five chapters of the forthcoming Manual of 1918 are in the hands of the printer, and it is expected that this part of the manual will be available at an early date for distribution.

A foreword has been inserted making immediately applicable for future work the principles therein set forth.

While no radical changes have been made in the general outline of procedure, it will be found that much new matter has been introduced tending toward a higher standard of efficiency in the accomplishment of original surveys and resurveys than heretofore attained in preceding editions of the manual.

ALASKA SURVEYS.

The progress made in the execution of public-land surveys in Alaska during the past fiscal year is on the whole satisfactory. The same difficulties confronting the parties in the States were encountered in the far North and made their influences felt in certain directions. The steady expansion, however, of the rectangular survey net along the main line of the Government railroad and its branch lines and the country contributary thereto in the Tanana and Nenana Valleys under the Fairbanks base and meridian and in the Susitna Valley, Knik Arm, and Kachemak Bay regions under the Seward base and meridian, has kept public land surveys not only abreast of the requirements as they are understood, but, in accordance with the Land Service policy, in advance in many places of settlement and industrial development.

In the Tanana Valley the group of public-land surveys initiated in the early summer of 1917, under group No. 4, were extended southerly over agricultural areas up the valley of the Nenana River and along the line of the Government railroad, and connected with the surveys of the Nenana coal fields executed in 1915. During the last month of the fiscal year, surveys under this group were further extended in the vicinity of the town of Nenana northerly and easterly, up Gold Stream with the ultimate view of sectionizing the Gold Stream Valley adjacent to the Government line of railroad. Surveys were also extended from this group easterly up the Tanana Valley along the north bank of the river for the purpose of embracing existing settlements in that vicinity and of identifying other lands suitable for agriculture. This latter system of surveys has been designated group No. 8.

The rectangular system of surveys in the Susitna River Valley under the Seward base and meridian designated as group No. 5, were further extended by a double party during the 1917 field season from the limits of the surveys of last year, up the valley east of the river to the foothills and northerly along the line of the Government railroad to within 10 miles of Talkeetna. Towards the latter end of the fiscal year this same system of surveys but designated in this particular locality group No. 10, was further extended northerly by a single party. In my last annual report I called attention to the arrangement that had been made to extend the public land surveys this fiscal year to the agricultural areas along the north shore of Kachemak Bay on the west coast of the Kenai Peninsula. This was done, the geographic positions necessary to initiate the work having been taken from the triangulation net of the United States Coast and Geodetic Survey and computed in the rectangular net and referred to the Seward base meridian. These surveys were expanded under group No. 7, by two field parties to include the present settlement along the north shore of Kachemak Bay in the vicinity of Homer and in the last month of the fiscal year, in the 1918 field season, were further extended under group No. 9 northerly along the east shore of Cook Inlet. Considerable work was also done during the latter part of the 1917 season under group No. 6, which embraces the area along the west shore of Knik Arm, by the two field parties that had been working under group No. 7. These parties extended the surveys of 1911 southerly along the shore areas to Point McKenzie. In addition the subdivisional surveys in Ts. 19 N., Rs. 3 and 4 E., of the Seward base and meridian begun in the latter part of the fiscal year were completed. They embrace a small area of coal land on Granite Creek, which is properly an addition to the Matanuska coal field. Also a minor revision of the surveys embraced in group No. 2, consisting of the establishment of closing corners on the boundary of the Point Campbell Military Reservation, situated southwest of Anchorage, was made.

TOWNSITES.

Several townsites in Alaska were surveyed during the fiscal year. Eska townsite in sec. 15, T. 19 N., R. 3 E., Seward base meridian, located on a spur of the Matanuska branch of the Government railroad, was completed, as was also the townsite of Girdwood situated on the north shore of Turnagain Arm on the main line of the railroad. These townsites were surveyed at the request of the Alaskan Engineering Commission. Also at the request of the commission, additions to the townsite of Nenana, consisting of lots and acreage tracts, were laid out on the ground. This survey was completed in the early fall of 1917, but on account of frozen ground the permanent monumenting thereof had to be postponed and again postponed in the spring on account of exceptionally high water in the Tanana River.

The townsites of Haines and Douglas in southeastern Alaska, were surveyed in the late fall of 1917, the chief of the Alaska Field Division acting as trustee. The next spring the survey of the townsite of Petersburg was begun but had not been completed at the close of the fiscal year. The expenditures for the survey of these townsites are reimbursable to the appropriation from funds derived from the sale of lots by the trustee. The notes and preliminary plats of the survey of the townsites of Wasilla, Esta, Girdwood, Haines, and Douglas, were completed. The notes and plats of the Nenana addition were held, pending the completion of the permanent monumenting of the surveys on the grounds.

EXAMINATIONS, SPECIAL SURVEYS, INDIAN ALLOTMENTS.

Twelve examinations of isolated surveys situated on the Alaska Peninsula were made in the fall of 1917. A special survey was made of a reservation for the Protestant Episcopal mission site at Fort Yukon, where the encroaching Yukon River has carried away nearly all of the present mission site, thus creating the necessity for an additional reservation. The surveys of several Indian allotments recently authorized will be made during the present field season.

RECOMMENDATIONS.

During the fiscal year 1919 surveys should be further continued up the Susitna River in the vicinity of Talkeetna over areas previously described as included in group No. 10. They should also be extended from Kachemak Bay along the east shore of Cook Inlet over areas included in group No. 9. In this region there is a great area of land covered with good native grasses and scattering timber, which is apparently adapted in every way for agricultural and stock-raising pursuits. The increasing activity in the fishing industry in Kachemak Bay and its proximity by boat to the Government railroad alone would warrant extensive surveys in this region to accommodate the growing but as yet scattered settlement. Surveys should also be extended northerly and easterly from Nenana, up Gold Stream and along the north shore of the Tanana River, until they connect with the present survey system in the vicinity of Fairbanks, all under the Fairbanks base and meridian.

In general, the comprehensive plan of the Land Service, which is to further in every possible manner, both by its individual action and through cooperation with other services, the material welfare and development of Alaska, contemplates the survey of all lands possessing agricultural or grazing possibilities adjacent and tributary to the line of the Government railroad from Turnagain Arm to the Talkeetna River, including the Matanuska branch, and from Lignite Creek to Fairbanks. This will embrace many proven areas as well as areas which as yet are virgin fields, but which by reason of their natural characteristics will undoubtedly be in demand at some future time. The stretch of land already surveyed along the line of the Government railroad is in places extremely narrow and in other parts many miles in width as the topography of the country might dictate, but the survey spread thereover is contiguous, which is of considerable importance and value from the surveying standpoint. Such a connected system over so great an extent of country offers a ready and permanent basis for the expansion of the rectangular system from practically any point on the railroad in either direction should future development so require.

The survey of the townsite of Petersburg in southeastern Alaska, now nearing completion, should be completed, as should also the work of monumenting the survey of the addition to the Nenana townsite. The survey of all authorized Indian allotments and the examination of surveys completing all such work this surveying season, and as weather conditions permit of a longer field season in southeastern Alaska than elsewhere in the Territory, it is entirely practicable to accomplish this end. Arrangements for the surveys of cemetery sites at Valdez and at Eagle have been made, with a view to accomplishing this work this season.

The following is an excerpt from the annual report of the surveyor general for Alaska:

> In extent Alaska is an empire. It is about one-fifth the area of the United States, containing approximately 375,000,000 acres of land. Being of such wide extent, it has a variety of climates. Generally speaking, it may be said that on the portion of it lying south of the Yukon River the growing of crops of one kind or another is practicable, while in favored localities in the southern part of the Territory grain crops which are adapted to the northern temperate zone will mature. Nearly the

whole of said portion of the Territory, excepting where too mountainous, is well adapted to stock raising, as a luxurious growth of nutritious grasses abound.

For causes hereinafter explained, settlement of the agricultural portions of the Territory has been slow. Consequently, but few applications and petitions for the extension of public-land surveys have been received. The two greatest reasons for this are that the people who have heretofore come to Alaska are not farmers, but have been lured here by the gold and other minerals which abound so plentifully in its mountains and gulches; and because of the lack of facilities for reaching the agricultural lands, which, for the most part, are situated in valleys in the interior, remote from established lines of transportation.

The cost of reaching the cultivable lands with farming equipment and household goods, and of transporting the products of the farm to market, is so great as to deter settlement upon them by homeseekers. When this handicap is overcome—and with the advent of the Government railroad it will be, in some localities at least—settlement will be more rapid.

This is true of the Susitna Valley which, from information gleaned from many sources, contains the largest and best body of agricultural land in the Territory. The climate of the valley is probably finer than any other locality of similar extent in Alaska, having fair and clear weather in the spring and summer months, with just enough rainfall to supply the needs of growing crops.

In further extending the surveys in this valley, it is respectfully suggested that in the future more care be given in selecting the lands to be surveyed; that only the best and most adaptable land for cultivation and settlement be selected for survey, and that the survey of large tracts of swamp land be omitted. This should be done even if it will result in the survey of noncontiguous townships.

There is also need of additional surveys in the Tanana Valley, especially in the vicinity of and including the hot springs, the lower part of the valley, and along the Valdez trail up as far as Richardson.

The Tanana Valley is undoubtedly the best grain country in Alaska, and there is considerable agitation about erecting a flour mill at Fairbanks.

There are many settlers on Kodiak Island, which contains fine pasture land, and it has been demonstrated that stock can be profitably raised there, redtop and other nutritious grasses being abundant. Similar conditions prevail in many of the valleys of the coast of southwestern and southeastern Alaska and on some islands of the Aleutian and Alexander Archipelagoes.

There are about 100 square miles of agriculture land in the Chilkat Valley, and there are at least 50 homesteaders, some of them having as much as 30 acres under cultivation. They ship their products to all parts of southeastern Alaska and even to Seattle, Wash.

There are a number of settlers in the Eagle River Valley, where the advantages of settlement are equally as good as in the Chilkat Valley.

The Chilkat and Eagle River Valleys are being fast settled and the settlers should be given title to their homes. To survey the valleys will require independent base and meridian lines, but the surveys should be made without delay.

To avoid complications with Indian claims and to adjust conflicts, the policy of surveying Indian allotments should be renewed without delay.

Homesteaders who settle in good faith on land not embraced in the public surveys should have their claims surveyed at the Government's expense and not at their own expense, as now required.

In view of the conditions herein stated, it is considered that the estimate of $50,000 for the surveying service is conservative.

OFFICES OF SURVEYORS GENERAL.

The condition of the work in the offices of surveyors general is satisfactory, as is apparent from the consolidated work report, which will be found in the appendix. A comparison of this report with the one submitted for last year shows a decrease in the number of miles of public-land surveys approved this year, but the explanation for this is that there are now pending in the various offices the returns of more than 200 townships, which are complete in so far as the office work is concerned—that is, the surveyor's field notes are transcribed and the plats are made, and both compared, but the approval has been delayed on account of the lack of the surveyor's signature to the notes. In Arizona alone the office work on 180 pending townships is completed, but the approval has been delayed. Many of our surveyors have enlisted; some are in the trenches in France and some in training camps; others have been assigned to work far distant from the places where the surveys were executed; and the submission of the finished field notes to them for signature has occasioned the delay in the approval of the returns by the surveyors general. Steps have been taken to avoid this difficulty in the future, and during the fiscal year 1919 all of this pending work will be cleared up. If we had been able to approve all of the public-land work that is finished in the offices of surveyors general the consolidated report would show a substantial increase in that work.

It is gratifying to note the increasing efficiency in these offices, as evidenced by a comparison of the consolidated work reports for the fiscal years 1917 and 1918. While these reports show a decrease in the number of miles of public-land surveys approved, for the reasons stated above, they also show a decrease of $0.61 per mile in the office cost, or a saving of $22,768.80 over what the office cost of the same amount of work would have been at the rate obtaining the previous year. In all, there were approved this year 9,628,129 acres, exclusive of the surveys in the Territory of Alaska and the fragmentary surveys executed in the eastern district, and the average cost per acre, including the costs incurred in executing the field work and the work in the offices of surveyors general, was $0.076. Public-land surveys are becoming more expensive each year by reason of the fact that all of the valley lands were surveyed years ago, and most of the public-land surveys are now being extended over rough, mountainous and heavily timbered country. In most cases the surveys are fragmentary in character and are more complicated by reason of their being initiated from or closed against distorted or poorly executed surveys, the corners of which are difficult to find and identify because of the lax manner in which they were originally established.

During the year 1918 there were 1,931 mining locations approved, which is an increase of 385 from the preceding year, and there was a reduction in the office cost of $1.18 per location, or a total reduction of $2,298.58 over what the surveys would have cost at the rate that prevailed in 1917. There were 553 forest homesteads approved, which is a decrease of 371 over last year, and the cost was reduced $1.73 for each homestead. These homestead entry surveys, which are within national forests, are executed in the field by the Department of Agriculture under the supervision of the General Land Office and the direction of the surveyors general. This work is practically current, and the surveyors general are handling all of the work that is presented by the Department of Agriculture expeditiously and at a less cost than heretofore. There was an increase in the number of miles approved in the survey of Indian reservations, and the average office cost per mile for this work was also reduced from $7.34 in 1917 to $2.12 per mile in 1918, or a total reduction of $1,597.32 from what the cost would have been last year. The number of miles of miscellaneous surveys approved this year was less than in 1917, and the office cost was reduced from $5.07 to $3.05 per mile, showing a saving of $1,533.48. This work is practically current. Besides the work above referred to, there were 557 supplemental and segregation plats prepared in accordance with instructions from the General Land Office, and the amount of $5,617.50 was deposited in the United States Treasury to the credit of miscellaneous receipts on account of copies of records, for work prepared in the offices.

The offices of the surveyors general have suffered the same inconvenience through enlistments and the draft as all other branches of this department. Many of our skilled and trained draftsmen have gone to the front, and we have experienced great difficulty in filling the places left vacant. We have been able to overcome the depletion of these offices to a certain extent and to keep the forces reasonably well balanced by availing ourselves of the provision of the act making appropriations for the legislative, executive, and judicial expenses of the Government for the fiscal year 1918, which allowed us to detail and transfer clerks from one office to another for temporary periods. We have also transferred United States surveyors and transitmen who were competent draftsmen, from the field surveying service to these offices for temporary periods during the winter months, when they could be spared from field service, and through these means we have managed to keep the work in a satisfactory condition without serious detriment to other branches of the service.

Until recent years no determined effort had been made to keep an accurate and detailed account of the separate units of work performed in the offices of surveyors general. The work had never been thoroughly systematized nor the practice made uniform, although the work in all of the offices was of the same general character, the use of the numerous appropriations and deposits under which the work of these offices was conducted was loose and unsatisfactory. On inspection it was found that one office was doing a thing one way and one another, and that employees doing the same class of work were paid at different rates of salary. As a result of consistent and systematic examination and study of the work of each office, this has all been corrected, and the forces are now evenly balanced and working at their full capacity. A monthly work report is now made, and a cost-keeping system which had previously been promulgated is operative and uniform. We now know exactly what we are doing and how much it costs.

The result is evidenced by the decrease in the cost of work performed in these offices, and the further fact that when the personnel of the various offices is complete there are now employed 29 less clerks than formerly. Mineral surveys formerly were costing the mining claimants an average of $22.27 per location, and in some instances the cost was running as high as $35 per location. Last year the average cost was $15.93, and this year the average cost was $14.75 per location. The same relative improvement has been made in the cost of office work on regular public-land surveys. This reduction in cost was accomplished by introducing uniform methods in accounting, discontinuing old, obsolete, and useless practices and records, installing modern filing equipment, computing devices, card indexes, graphical files, electric blue-print machines, and detailing clerks and draftsmen from one office to another when the work required it.

By the provisions of circular No. 605, issued June 25, 1918, surveyors general were given authority to transfer clerks from one class of work to another in order to expedite the work, without securing specific authority from this office. Clerks paid from mineral deposits and other special deposits by individuals, who have formerly been on a per diem basis, have been placed on an annual salary basis and receive the benefits of the 30 days' annual and 30 days' sick leave, which they had not theretofore received.

Much good would be accomplished if the appropriations for the expenses of offices of surveyors general could be made in a lump sum, and distributed according to the needs of the individual office under the supervision of the Commissioner of the General Land Office, as I have recommended in the estimates for the last three years.

ALASKA COAL LANDS.

In the Nenana coal field 25 leasing blocks have been created, comprising an area of approximately 20,840 acres in the valley of Hoseanna, or Lignite Creek, a tributary of the Nenana River. Blocks Nos. 2 and 3, containing 1,560 acres, were reserved by the President, and the remaining lands were, on February 13, under the act of October 20, 1914 (38 Stat., 741 tions under said act approved May 18, 1916 (45 plication for lease was filed and publication of but the application was later withdrawn and no field has yet been made.

In the Bering River field a lease of blocks 18, containing 2,420 acres, was executed on June 8, 1. investment to be made by the lessee in develop. the land was fixed at $250,000, and work on t begun and early mining operations are probable. lease blocks 49 and 50 of this field has also been action is awaiting publication of notice under th two blocks contain 2,080 acres.

No further leases have been made in the Matan ditional block designated as No. 20, containing 760 immediately northeast of block No. 7, was creat lease on December 3, 1917. No application to lease received. By order of December 3, 1917, block No. include additional contiguous lands which were the block was originally constructed, making a tota the block as amended. The lands in this block wer President under proclamation dated December 5, total of 5,086.17 acres of reserved lands in the field tions have been conducted during the year by the Nos. 2 and 3 and by the Alaskan Engineering Co reserved lands in block No. 7 and in development also reserved. The lessee of blocks Nos. 10 and 11 h for some time in opening a mine and installing mi upon the land for coal-mining operations.

ALASKA SHORE SPACES.

The act of Congress approved May 14, 1898, enti tending the homestead laws to Alaska, etc. (30 Stat., among other things, that between homesteads, sold homesteads, and trade and manufacturing sites abutti of any navigable water, a shore space of at least 80 rods sh from entry. The act of Congress approved March 3, 1028), amends the act of May 14, 1898, with the ad sion—

> That no location of scrip, selection or right along any navigable or be made within the distance of 80 rods of any lands, along said water cated by means of any such scrip or otherwise. * * * *Provided*, shall be allowed extending more than 160 rods along the shore of any and along such shore a space of at least 80 rods shall be reserved fr all such claims.

A bill is now before Congress (H. R. 12210) declaring that the provisions above cited, in so far as they reserve a shore space of 80 rods in width between tracts sold or entered under the provisions thereof, and that no entry shall be allowed extending more than 160 rods along the shore of any navigable water, shall not apply to lands listed by the Department of Agriculture for entry under the act of June 11, 1906 (34 Stat., 233), and that the Secretary of the Interior may, in his discretion, restore to entry and disposition such reserved spaces as he shall determine are not necessary for harborage purposes.

This bill is the result of several attempts to secure legislation modifying or repealing the shore space and shore frontage provisions of said acts. I think legislation to this general effect has been recommended by nearly every Government official who has had anything to do with the public land business in Alaska. The Legislature of Alaska has passed resolutions to the same effect. While strongly of the opinion that all necessary withdrawals and reservations for the public use in Alaska should be made, I am quite convinced that the shore space and shore frontage provisions as they now operate are conducive more to the detriment of Alaska than to any public advantage or interest that they may subserve. An arbitrary rule for reserving shore spaces and limiting the amount of frontage that can be taken with a view to preserving such shore spaces for the public, without any reference to an intelligent consideration of the necessity or desirability of reserving any particular space, I believe fails to accomplish the purpose intended. In the first place, it should be noted that the most desirable spaces for harborage or fishing facilities are those first taken, thus leaving the less desirable spaces to be reserved automatically for the public. In the next place, it should be noted that a claim, though less than an acre in extent along the shore of navigable water operates to reserve all the space for a distance of 80 rods on either side. Thus we have a system whereby, by locating claims regardless of their size 160 rods apart, one may withhold from use by anybody else not only the area of the claims but all the intervening space. Our records show numerous cases where this very thing has been done to control fishing privileges. Again, the desirable agricultural lands in Alaska are invariably along the streams and the reservation of 80 rods between every claim necessarily restricts settlement and development to that extent. These restrictions as to frontage in the case of entries on crooked streams and small islands with an irregular coast line, render the practical application of the rule, with justice to claims, well nigh an impossibility; this is especially the case where the regular public land surveys have been extended and the land must be taken by legal subdivisions. Moreover, as the law now stands, no use of the reserve shore spaces is permissible except for "landings and wharves" (act of May 14, 1898, 30 Stat., 409, sec. 10), under a revocable permit; up to the present time there have been very few applications for such permits, under which only such structures and facilities may be provided as are for the public use.

For these reasons I submit that the shore space reserves and water frontage restrictions should be repealed in their entirety, with authority vested in the Secretary of the Interior to restore such existing reserve spaces, or parts thereof, as in his judgment will not interfere with the public interests, and to withdraw such additional shore areas as the public interests may require.

DRAFTING AND MAP MAKING.

The United States map, 1918, was prepared for the lithographer and printed within the usual time, but the prohibition by the Food Administration of the use of flour for making paste for mounting the maps, and labor conditions in connection with the work of mounting have delayed the delivery of the map to Congress.

Maps of Montana, South Dakota, and North Dakota have been issued during the fiscal year, and maps of Arizona, Oregon, Washington, Idaho, and Colorado are in course of preparation and revision.

Two maps showing the Oregon and California Railway lands in Oregon revested in the United States by act of June 9, 1916 (39 Stat.. 218), and restored to entry, were compiled and drawn for the use of the Roseburg and Portland district officers at the opening of said lands.

Under the system now in operation the office is better prepared to furnish information as to plats of survey than at any time heretofore. It is well known that one can go to the local office and procure a diagram of a township plat showing the status of the land, for from $1 to $4, depending on the amount of information that is placed on the diagram. There is a great demand, however, for copies of the actual plat showing topography and other features. In former years reproduction of the plats was not easy to procure, for practically the only way to get them was to redraw or make the tracing for a blue print. At that time three original plats had to be made in the office of the surveyor general. One plat was actual original drafting from the field notes, and two others were drawn from that, making the three official plats, one for the surveyor general, one for the local office, and one for this office. Under the present plan the surveyor general makes one original plat and sends it here, whereupon it is photolithographed, making two photolithographic copies on hard paper for official use, and an additional 22 which are filed for official use and for sale to the public at 25 cents each. Last year the office sold over 14,000 such copies, and furnished 6,000 copies to different branches of the Government for official use, without charge. In addition to these copies one photolithographic copy is printed on tracing cloth and returned to the surveyor general so that his office at all times has a tracing from which he can readily make a blue print, at slight cost. So far as funds have been available, the office has been photolithographing old plats particularly in those States or sections where there has been a heavy demand for plats. The office has now in stock approximately 60,000 editions of photolithographic copies of township plats, leaving about 40,000 of which no copies have been made. This stock of photolithographic copies has just been installed in new cases costing $10,600, in the new building, and are now in the most accessible permanent shape we have ever had them.

TRACT-BOOK NOTATIONS.

The total number of tract-book notations for the present year was 393,434, as compared with 356,745 during the previous year.

This total includes 4,978 Indian allotments, 44,910 petitions to designate under the 640-acre stock-raising homestead law, and 49,579 patents. The number of plats posted was 2,270.

PRELIMINARY EXAMINATIONS.

Homesteads, desert entries, timber and stone applications, etc., were given a preliminary examination as to their validity, to the number of 49,419, of which 38,446 were passed and 10,973 held for further action on account of defective papers, errors in execution, or for conflicts, withdrawals of land, etc. This procedure enables the applicants whose papers need correction to promptly remedy the discovered defects when the case is first received in the office, and so protect their claims as against other applicants.

WITHDRAWN APPLICATIONS.

To clear the records at the earliest practicable moment of claims embraced in applications thereafter withdrawn or abandoned, direction was given that all such cases should be promptly sent to the division in charge of the tract books and there closed out and so noted, and as a result of such order, which was issued last February, final disposition had been made of 3,252 cases, mostly petitions for designation under the enlarged homestead act and homestead applications at the end of the fiscal year.

SUPPLEMENTAL PATENTS.

Supplemental patents under the act of April 14, 1914 (38 Stat., 335), were issued in 751 cases. Patents are issued under this act in cases where the original patent contained a reservation of coal to the United States, but the lands covered thereby were subsequently reclassified as noncoal in character.

CERTIFIED COPIES.

In early times certified copies of documents all had to be copied in longhand, later by typewriting, but now almost exclusively by photography. If we were compelled now, with the present demand for copies, to make them in the old way, half the force of the office would be required. The Federal farm loan has had a marked effect in increasing this class of work. Under this act many people seek loans who could not theretofore procure them. To get the loan, the title must be perfect. Particularly in the Southern States, many titles were imperfect, resulting in an immediate rush of business for certified copies of patents or other papers. Some abstract companies are now giving heavy orders for copies of all the patents issued for certain townships or a certain county in order to perfect their records. In 1897 the office furnished 4,100 pages of certified copies; in 1907 we furnished over 18,000; in 1917, over 88,000; and in 1918, over 125,000.

HOMESTEADS AND KINDRED ENTRIES.

The number of entries of all kinds approved for patenting is 32,120, against 34,085 of the previous year. Of this number 29,095 are homesteads, being divided as follows: 2,303 commuted, 25,500 under the three and five year homestead law, and 1,292 under the forest homestead act of June 11, 1906 (34 Stat., 233). The remainder, 3,025, being timber and stone, isolated tract sales, and other cash entries.

Under the second homestead law of September 5, 1914 (38 Stat., 712), there were 5,243 applications acted upon. Of this number 3,408 were accepted, the remainder being disposed of by denial or by calling for additional evidence.

Entries upon which final certificates have issued are about six months in arrears. Miscellaneous applications, such as isolated tracts, applications to amend, to reinstate, appeals, etc., are about nine months in arrears. These arrearages are due to the changes, incident to the war, in the personnel of the clerks having charge of this class of work, 25 clerks having gone out of the division during the fiscal year, entailing the loss of time necessary to the instruction of the new clerks.

THE STOCK-RAISING HOMESTEAD ACT.

In my last annual report I commented at considerable length as to the different views presented to Congress with respect to this legislation (39 Stat., 862), and presented some of the difficulties that would undoubtedly be encountered in its administration.

The general provisions of this act are more or less well known, but it should be kept in mind that the lands subject thereto are those designated by the Secretary of the Interior as "chiefly valuable for grazing and raising forage crops, do not contain merchantable timber, are not susceptible of irrigation from any known source of water supply, and are of such character that 640 acres are reasonably required for the support of the family." It is, therefore, seen that prior to the allowance of entries under this act, a designation of the lands subject thereto is necessary, which in turn calls for a field examination as a basis for such action. Although this requirement was imposed by the act, no provision therefor was made in the way of an appropriation until several months after the passage of the act so that operations thereunder were for a considerable time held in abeyance. I am, however, able to report notable progress at the present time, some 7,500,000 acres of land having been designated as falling within the descriptive terms of the act and subject to entry thereunder. Up to the end of the fiscal year, 734 entries have been allowed under the act, embracing an acreage of 236,578 acres.

Inasmuch as entries are only now beginning to be allowed under this act some of the administrative difficulties have not yet arisen, notably under the exercise of the preference right accorded by section 8 of the act. This section provides that any homestead entryman or patentee who shall be entitled to an additional entry under the act shall have, for 90 days after the designation of lands subject to entry under the provisions of the act and contiguous to those entered and owned and occupied by him, a preferential right to make additional entry. Conflicts will almost certainly arise under these provisions where such preferential right will be asserted by one or more persons as against the original applicant.

The designation of stock driveways under the provisions of this act is treated under the title next following herein.

STOCK DRIVEWAYS.

Since my last annual report was submitted, field investigation of all applications from stockmen and recommendations of the Forest Service for stock driveways in Montana and South Dakota has been completed, and such applications and recommendations have been disposed of, and the same may be said of the work in Colorado, Oregon, Washington, and Wyoming, with the exception of pending investigations of certain recent or incomplete applications, or of areas heretofore temporarily withdrawn for such purpose pending further investigation. The greater portion of the stock driveway applications and recommendations in California and New Mexico have been acted upon, and stock driveways have been established in Arizona, Idaho, Nevada, and Utah, and field investigation is progressing satisfactorily on the remaining recommendations and applications in those States.

Based upon field investigation and my recommendations, you have withdrawn under authority of section 10 of the act of December 29, 1916 (39 Stat., 862), 2,079,979 acres, inclusive of scattered entries or patented tracts, during the fiscal year, for stock driveway purposes, and released 79,344 acres from such withdrawals. The total area withdrawn for stock driveway purposes at the close of the year is, 2,794,586 acres, 329,050 acres thereof having been temporarily withdrawn by Executive order under the act of June 25, 1910 (36 Stat., 847), for such purpose prior to the passage of the act of December 29, 1916. The withdrawn area is distributed by States as follows: Arizona, 441,292 acres; Colorado, 192,066 acres; Idaho, 82,630 acres; Montana, 188,564 acres; Nevada, 45,330 acres; New Mexico, 742,358 acres; Oregon, 367,631 acres; South Dakota, 18,320 acres; Utah, 170 acres; Washington, 2,346 acres, and Wyoming, 713,879 acres.

SOLDIERS' ADDITIONAL RIGHTS.

While there has been a decrease in the number of these cases received during the past fiscal year, it is impossible to hazard a guess as to the future rate of decrease. In the months of April, May, and June, 1918, the number of soldiers' additional applications received was smaller per month than the number received for any one month for a number of years. However, in the month of July, 1918, as many cases were received as in the months of April, May, and June combined.

Applications are still being received based on assignments executed prior to the departmental administrative order of February 15, 1917 (46 L. D., 32), referred to in my last annual report.

The following table shows the number of cases pending at the beginning of each fiscal year from the fiscal year ending June 30, 1910, to the fiscal year ending June 30, 1918, both inclusive, the number received each year, the number closed and the number on hand at the end of the fiscal year:

Fiscal year ending June 30.	Cases pending beginning of year.	New cases received.	Cases closed.	Cases pending at end of year.
1910	1,365	692	653	1,404
1911	1,404	740	713	1,431
1912	1,431	495	1,150	776
1913	776	491	497	770
1914	770	522	636	656
1915	656	559	838	377
1916	877	636	570	443
1917	443	674	586	531
1918	531	493	578	446

Since the beginning of the calendar year 1916 the work of this office in connection with soldiers' additional matters has been growing more complicated. Unusual activity on the part of scrip dealers in hunting up rights still held by soldiers and their widows has resulted in a large increase in the number of requests, personal and by correspondence, for information respecting these rights. The answering of these inquiries has made serious inroads on the time available for the adjudication of cases. Also the adjudication of these cases becomes more complex and difficult with the lapse of time. Sometimes one application for a forty-acre tract involves from two to twelve fractional rights and requires as much time in its adjudication as so many individual cases. Even a case based on one right requires more time and care than heretofore, due to the slight probative value of the evidence available at this late date.

Of the 446 cases pending on July 1, 1918, 75 were fully ready for adjudication and 47 cases (involving 88 soldiers' additional rights) were pending for "preliminary work" in connection with the procurement of information from the Pension Bureau, the Adjutant General, and the auditors for the War and Navy Departments, and from the old files of this office relative to the alleged soldiers' additional rights involved. The remaining 324 cases were awaiting outside action, by the applicants in most cases, and in other cases by the Field Service of this office, the Geological Survey or by the department on appealed cases.

Sixty-four of these 324 cases are applications filed in the Juneau, Alaska, office for lands embraced in special surveys.

Much more time and labor is required in the adjudication of these Alaska cases than in applications filed in the States for surveyed lands. The surveys are made at the expense of the applicants, by United States deputy surveyors. They are then examined by the field force of the United States surveyor general and approved by said officer before notice of the claim can be given by posting and publication extending over a period of 60 days instead of 30 as for surveyed lands.

Examination of the lands must also be made by the field service as to the character of the land in regard to metalliferous minerals, coal, oil, gas, phosphate, hot springs, water power and reservoir value, extent of frontage on navigable or other waters, limitation of area to a single body of 160 acres, intervening reserved spaces of 80 rods, waters situated upon or crossing the lands, which are navigable for small water craft or which lead to spawning grounds or are themselves spawning grounds for salmon and other merchantable seagoing fish, occupancy or claims by natives of Alaska, Government reservations and withdrawals.

Provisions have been made for coordinating the forces of the surveyor general and the field service, thus facilitating the work by having all the subjects above enumerated covered by a single examination as far as possible, and making interchangeable reports to the Chief of Field Division and the surveyor general, respectively, by the examining officers.

The brevity of the "open season" and the limited facilities of travel in Alaskan waters for reaching the lands by all parties concerned, both for making the surveys and for conducting the examination, occasion much of the delay in the completion of these cases and their final adjudication for the issue of patent.

Doubtless no law ever passed by Congress for the benefit of the soldier has more utterly failed of its purpose nor better laid the foundation for fraud and subversion of the general policy of the public land laws than sections 2306, 2307, Revised Statutes, as those sections have been finally construed and applied. They are good examples of what should not be repeated.

PREEMPTION ENTRIES.

The preemption laws, except sections 2275, 2276, and 2286, United States Revised Statutes, were repealed by section 4 of the act of March 3, 1891 (26 Stat., 1095), but the right to perfect all bona fide claims lawfully initiated before the passage of said act was preserved.

Section 10 of the act of 1891 also provided that nothing therein should change, repeal, or modify any agreement or treaties made with any Indian tribes for the disposal of their lands or of lands ceded to the United States to be disposed of for the benefit of such tribes. An interesting question concerning the application of said section 10 arose recently. There was found to be a small tract of unappropriated lands in the former Quapaw strip, situated in the southeastern part of Kansas. This land had been ceded by the Indians, and was to be disposed of under the preemption law according to the provisions of the act of June 5, 1872 (17 Stat., 228), settlers being required to pay $1.25 per acre for the land. The Government had fully compensated the Indians for the lands ceded by them prior to the opening of the lands. The Indians had no further interest in the lands, and therefore it was held that the land was no longer subject to disposition under the preemption laws, but under the homestead or other laws relating to public lands. Practically all of the preemption entries now being made are for lands within the ceded Ute Indian Reservation in western Colorado.

Prior to the passage of the repealing act mentioned, the preemption work of the General Land Office was important, as preemption entries were a popular method of securing title to 160 acres of the public lands, since the law and regulations required residence and cultivation only for a period sufficiently long to indicate the good faith of the settler. The records show that during the past fiscal year there were 128 preemption entries made, as against 137 for the previous year.

RECLAMATION.

This work is now up to date. During the past year the foundation was laid for three new reclamation projects in Utah, to be known as the Cashle Peal project, the Dixie project, and the Peace River project, by the withdrawal of large tracts of public land for each.

One large restoration known as the Teton unit of the Sun River project in Montana was made, aggregating about 40,000 acres. So great was the competition for these lands that approximately 5,000 applications therefor were filed. It will be at once apparent that, on the basis of 160-acre homesteads, only 1 applicant in 20 could obtain the land applied for, and when it is considered that the land had been designated and that many of the applications were for enlarged homesteads of 320 acres each, the percentage of unsuccessful applicants will be much larger.

Besides the withdrawals and restoration above referred to, there were 22 other reclamation withdrawals, and 94 restorations, all for much smaller areas. In all, there were withdrawn for reclamation purposes during the year, 676,800 acres, and restored to entry 277,380 acres.

Fifteen hundred and fifty-seven original reclamation homestead entries were received during the year.

Seven hundred and seventy-four final homestead proofs were received during the year and 945 disposed of, as against 828 the previous year. Of those disposed of, 913 were patented in 1918, as against 824 in 1917.

LIEU SELECTIONS FOR LANDS IN NATIONAL FORESTS.

Decisions of considerable importance and of more than usual interest to the Land Department were handed down by the Supreme Court of Oregon in the case of the State of Oregon *v.* Hyde et al. (169 Pac. Rep., 757, decided Jan. 8, 1918, and 171 id., 582, on review, decided March 19, 1918). The court held that many of the patents issued by the State for its school lands were obtained by fraud, and their cancellation was decreed.

The case is an outcome of the well-known "Hyde-Benson" frauds arising out of the act of Congress of June 4, 1897 (30 Stat., 36), known as the forest lieu selection law, and the law of the State providing for the disposition of its school lands.

Shortly after the enactment of the federal lieu selection law, Hyde, one of the defendants in the case decided, conceived the fraudulent plan of acquiring title to Oregon school lands by the use of fictitious and dummy claimants, and to use such lands as then were or became embraced in a forest reserve as a base for the selection of lieu lands elsewhere.

After applications were made, assignments were obtained from the supposed applicants running to Hyde or his confederates. The price of the State lands was, of course, supplied by Hyde or by one of his confederates for him. This right to the base land became of great value to Hyde. It was in effect a scrip right locatable upon any of the public land subject to settlement with nothing more to be done practically than to convey or relinquish the base land to the United States and select the lieu lands. Those rights being transferable, found a ready market and sold at a price per acre far in excess of the price paid to the State. As was found by the Oregon court, approximately 41,400 acres of the State's lands were transferred to Hyde and his associates in the manner described.

On the face of things, the title to the State land and the right to select were satisfactory. One of Hyde's confederates through whose instrumentality many of the dummy and fictitious applications were obtained, became aggrieved, perhaps over the division of the spoils, and gave information to a special agent of the Land Office which led to investigation resulting in the cancellation by the Land Department of many of these selections and the conviction of Hyde and his associates for conspiracy to defraud the United States.

When the State of Oregon instituted suit for the recovery of title to the lands involved, there were a number of selections still pending against which the Land Office had directed proceedings with a view to their cancellation based on the evidence obtained by its investigations, embracing the same base lands included in the suit. The State, through its officials, asked the cooperation of the Land Office and particularly of the Field Division in Oregon in procuring evidence and otherwise to help in the prosecution of these suits. This was done. All the evidence obtained and available was turned over to the State and all other aid that was possible and proper to give was given. When the knowledge of the institution of these suits came to the department in the latter part of 1912, the department was of the opinion that the better course would be to suspend the Land Office proceedings to await the outcome of the State's suits in the court, for substantially the same evidence the Land Office had was being used by the State, and if decrees favorable to the State were rendered, the expense to the Government of a trial would be avoided as the title to the base land would be restored to the State; the selector would have no title to convey to the United States and the selection could then be canceled without further proceedings. Consequently the order of December 5, 1912, directed the suspension of proceedings in the General Land Office to await a termination of the suits in court.

A number of these selections had been approved by the Land Department before the discovery of the fraud, and although approved, patents were withheld in the General Land Office, and as the Land Department had not lost jurisdiction over them, proceedings with a view to their cancellation were directed, as was also done with respect to the unapproved selections. The Oregon supreme court, in the case cited, held that it did not have jurisdiction to decree cancellation of the State patents where the Government had approved the selection, for the reason that the approval of these selections was tantamount to acceptance by the Government of the State's title, and that the United States should have been made a party to the suit to enable the court to render a decree that would be binding as to these lands, and this notwithstanding there was evidence before the court that as to them the Government had directed adverse proceedings, although it is true had not rendered judgment that the selections be canceled.

The Land Office will now take up these cases, and in those where the court has decreed cancellation of the State patents will hold the selections for cancellation for that reason. In the cases where the court held it had no jurisdiction it will renew adverse proceedings, utilizing the evidence introduced in the court, and if found to establish the fraudulent character of the claims then cancel them, which will leave the way open for the State to bring suit, if it so desires; there being then a judgment by the Land Department, after trial duly had, that the title to the base land was fraudulently acquired and will not be accepted.

On April 1, 1918, the department reversed, on review, its decision of January 31, 1916 (unreported), in the case of F. A. Hyde & Co., involving a selection, made under the act of June 4, 1897 (30 Stat., 36), of land in the Roseburg, Oreg., land district based on land in California. The selection had been rejected by this office on the ground that it was fraudulent and illegal in that the base lands were procured from the State of California in violation of section 3495 of the political code of the State, which required the purchaser to take the land for his own use and benefit and not for the benefit of another. In the decision of April 1, 1918, it was held that the act of 1897 had for its purpose the exchange by the United States of its land outside of national forests for equal areas of lands held in private ownership within national forest boundaries; and if by the approval of the selection the United States obtains a perfect and indefeasible title to the lands offered by the selector as a basis for the lieu selection, the selection should be approved; that in said case the State patented the base lands to an existing natural person, and the State patent is not void, nor voidable, more than 18 years having elapsed since its date and issuance, and the State having taken no action to avoid it, and that a suit now to declare it void is barred by the California statute of limitations. The decision states further that the approval of the selection will vest undoubted title to the forest base lands in the United States, will vest in the present claimant title to the lands selected in lieu thereof, and will in no way prejudice any interest of the State, for the State now has no interest that can be asserted in any way.

The facts in this case distinguish it from the case of Hiram M. Hamilton (39 L. D., 607), wherein the department declined to accept a title shown still to be defeasible because tainted with fraud, and the State had not indicated that it was not seeking recovery of the land, and the case of the State of Oregon *v.* Hyde et al. (169 Pac. 757), mentioned above, wherein the claim of the State was not only not barred by any statute of limitations, but the State was also strongly desirous of recovering its lands.

Between April 1, 1918, the date of this decision, and June 30, 1918, this office promulgated departmental decisions dismissing proceedings in 108 cases; and of the cases pending in this office dismissed proceedings in 15, finally, and in 1 subject to appeal on behalf of the Forest Service. The office is disposing of these cases as rapidly as is consistent with orderly administration, but there were still pending on June 30, 1918, about 85 cases apparently of this class. There are besides approximately 100 cases in which it is charged that title to the base lands is absolutely void because the State of California issued patents therefor to fictitious persons. Further testimony is being taken in these, about half of them having been remanded for that purpose by the department, before which they were pending on appeal.

Another decision of considerable interest, and affecting a number of other cases, was that rendered by the department on January 26, 1918, in the case of Allen M. Wheeler. Wheeler made a homestead entry October 11, 1900, for land in the Black Hills National Forest, S. Dak., and submitted final proof, which was accepted by the local officers and final certificate issued on November 20, 1900. The next day, or November 21, 1900, Wheeler conveyed the land to the United States under the provisions of said act of June 4, 1897, and later through attorneys in fact applied to select other lands in lieu thereof. Subsequently charges were preferred by this office against Wheeler's entry, alleging noncompliance with the requirements of the homestead law. He failed to apply for a hearing, and the entry was canceled September 12, 1904. The decision holds that the exchange should have been consummated, and that the proceedings against the entry should not have been taken, and that while a petition for the reinstatement of the original selection or selections could not be entertained except in the absence of an intervening adverse right, no reason appeared why the papers pertaining to the selection could not be returned to the parties entitled thereto, to be used in other selections under the provisions of said act of June 4, 1897, as amended by the proviso to the act of March 3, 1905 (33 Stat., 1264). As a result of this decision attorneys have been combing the records of this office in search of other similar cases on which to maintain a selection right to speculate in.

During the past year 96 selections under said act of June 4, 1897, have been approved for patenting.

The contested cases under the act of June 4, 1897, practically all involve charges by the Government of invalid base, arising out of the so-called Hyde-Benson conspiracy. Prior to April 1, 1918, this office rendered decisions in 61 of these cases, 17 of which were favorable to the selectors and 44 adverse; most of the latter were appealed to the department and none were finally closed.

LIEU SELECTIONS FOR LANDS IN INDIAN RESERVATIONS.

The act of April 21, 1904 (33 Stat., 211), authorizes selections of public lands in New Mexico and Arizona in lieu of lands in Indian reservations. About 1,400,000 acres have been selected and patented under this act. On June 6, 1916, the department decided not to allow any further exchanges under this act, unless in exceptional cases. Two such cases have recently arisen. The first relates to lands in the Navajo Indian Reservation, N. Mex., which the Santa Fe Pacific Railroad Co. proposes to exchange for other lands, and the exchange was urgently requested by the Indian Office. This will complete the exchange of the lands of said road in said reservation. Two or three hundred thousand acres are involved. The second case related to the Pueblo Laguna Indian Reservation, also in New Mexico, and involves about 47,000 acres, which the same company and the New Mexico & Arizona Land Co. propose to exchange. Negotiations are still pending.

CEDED CHIPPEWA LOGGING, MINNESOTA.

The past year has been a quiet one in Chippewa logging operations under the act of June 27, 1902 (32 Stat., 400). This was largely due to the unsatisfactory condition of the labor market; as well as to the fact that most of the timber has been cut. There has recently sprung up a demand for the unsold timber by a number of small loggers, indicating an improved condition of the lumber market. The unsold timber, however, is "left overs," and somewhat scattered.

During the past year there were cut under said act 11,788,200 feet of timber valued at $85,821.77, as against 12,935,820 feet, valued at $111,964.32, the previous year. The total amount cut to date under said act has been 1,280,744,846 feet of timber, for which the purchasers have paid $9,069,478.99.

MINNESOTA DRAINAGE.

An important amendment has been made in the regulations in the matter of acquiring title to lands under the act of May 20, 1908 (35 Stat., 169), known as the Volstead Act. This law is applicable only to lands in Minnesota, and applies the Minnesota drainage laws to United States lands in said State, both to unentered lands and to lands covered by an entry. Where these lands are assessed for drainage, they are sold for nonpayment of the drainage charges in accordance with the State tax laws. Title is acquired from the United States by the purchasers at the State sale, by making the proper payments at the United States land office, where the lands are what is known as *unentered* lands, and by showing their qualifications to make homestead entry. No residence, improvements, or cultivation is required in this class of entries. The former regulations required the affidavit as to qualifications to be made before an officer in the land district authorized to administer oaths in homestead cases. The amended regulation permits said affidavit to be made before an officer authorized to administer oaths and having a seal, whether his office is located either inside or outside of the land district, or before his commanding officer, if the purchaser is in actual service in the military or naval service of the United States.

If the lands sold by the State are covered by an entry, the purchaser at the State sale must await the expiration of the period of redemption provided by the State tax laws, and the entryman must be given notice of his right to redeem his lands before the purchaser can be allowed to make entry at the district land office.

During the past year the office reconsidered the matter of drainage cash entry, in which everything appeared regular, and all moneys due at the date of the patent certificate had been paid, but the issuance of the patent was suspended pending the payment of a drainage charge for which the land was sold subsequent to the date of said certificate. On January 29, 1918, a decision was rendered, in which it was held that the entryman could not be compelled by this office to pay any tax for which the land was sold after the certificate had issued upon an entry rightfully allowed under the act of May 20, 1908 (35 Stat., 169), and that the entry should have been approved for patenting, as provided in section 5 of said act, irrespective of a subsequent sale of the land under said act.

The act of May 20, 1918, requires purchasers of unentered lands to have the qualifications of a homestead entryman, and where an applicant to purchase lands under said act has made a former homestead entry he is not a qualified entryman under the drainage act unless his right has been restored by some special act of Congress.

In the case of Michael N. Goss, this office held that he had not made a showing which entitled him to make a second homestead entry under the act of September 5, 1914 (38 Stat., 712), and, therefore, was not qualified to purchase lands under said act of May 20, 1908. Goss's original homestead entry was made April 29, 1882, and he relinquished it November 13, 1882, without having made any improvements or established residence on the land, and without consideration. The department in its decision of May 7, 1918, ruled that Congress, in said act of May 20, 1908, adopted and read into the law the qualifications of a homestead entryman then in force, held that Goss had the qualifications of a second homestead entryman within the meaning of the act of February 8, 1908 (35 Stat., 67), which was in force when the act of May 20, 1908, was enacted, and allowed the application.

During the past year there have been approved for patenting 914 drainage cash entries made under the Volstead Act. These mostly for 160 acres, the limit allowed any one purchaser of unentered lands under the law, and the area thus patented was in the neighborhood of 146,240 acres, as against about 182,500 acres the year previous.

A total area of 590,600 acres has been patented under the Volstead Act.

MUD LAKE, MINNESOTA.

By circular of February 19, 1916, there were opened to homestead entry under the act of January 14, 1889 (25 Stat., 642), 4,929.64 acres in Mud Lake bottom, located in T. 156 N., Rs. 41 and 42 W. A State drainage project extended through Mud Lake and drained the lands. The lake was situated within the former Red Lake Reservation, one of the ceded Chippewa reservations. The question of title was submitted to the Attorney General, who rendered an opinion on June 9, 1912 (29 Op., 455), to the effect that the lands should be surveyed and disposed of for the benefit of the Indians, but that warning should be given prospective settlers of the possibility of litigation with patentees of lands surrounding said lake, claiming as riparian owners. The latter took the matter into the State courts, the suit appearing to be a friendly one between the parties, by which the lands in said bottom were divided among said riparian right claimants. Pursuant thereto, the lands have been assessed for taxation to said claimants. The entrymen for said lands have written numerous letters to this office about the situation, and consideration is being given to the proposition of instituting suit to quiet title to the lands.

PUBLIC SALES OF INDIAN LANDS.

One of the most popular methods of acquiring title to public lands is by public sale. There is usually a demand for whatever is offered, and tracts which have been subject to homestead entry for a considerable period, with no applicants for them, find eager purchasers when they are offered without the requirement of residence, improvements and cultivation as a condition to the acquirement of title.

The undisposed of lands in the ceded portion of the Crow Indian Reservation, Mont., aggregating 84,533.66 acres, were offered at public sale on September 4, 1917, coal lands to be sold with a reservation of the coal deposits, as provided in the act of February 27, 1917 (39 Stat., 944). The minimum price received was $2 per acre, the maximum $20, and the average price $4 per acre. The lands were listed by half sections, and provision was made for payment of the purchase money by installments. Every acre offered was sold.

At the sale of timber lands in the former Siletz Indian Reservation, Oreg., which was adjourned from September 25, 1917, to December 8, 1917, two sections of land were sold for $61,169.03, the minimum price. The lands sold aggregated 671.22 acres on which the estimates indicated that there were 62,990 M. feet of Douglas fir, spruce, and hemlock timber.

Public sales of unsold Flathead lands, located in Montana, were held in August of 1917. In the Missoula district 6,694.26 acres sold for $13,387.76, and in the Kalispell district 3,611.91 acres sold for $7,548.62. These lands had previously been appraised and opened to homestead entry at the appraised price, and remained undisposed of after seven years from the date of opening. The lands were mostly sold for an advance over their appraised price.

The undisposed of lands in the Coeur d'Alene Reservation, Idaho, were offered at public sale on August 16 and 17, 1917, and 1,326.98 acres were sold for $1,694.97.

OPENING OF INDIAN LANDS.

There were two openings of Flathead lands, Montana, during the past year. The first was held in September of last year, and the second in May of this year. The first one consisted of 2,693.66 acres of nontimbered lands, appraised at $7,150.72, and 4,983.58 acres of timbered land, appraised at $25,706 for the land, and $38,697 additional for 19,743 M. feet of timber.

The second opening consisted of 4,754.56 acres of timbered land, which were appraised at $20,989.15 for the land and $41,552.50 for 17,363 M feet of timber thereon. The law provided for the payment of one-third of the price of the land and the entire price of the timber at the time of entry where the land was classified as timber land. At the September, 1917, opening there were 22 applications filed for 22 units, or parts of units, into which the lands were divided for the purpose of the opening, for which there were no conflicting applications, and 48 other applications were filed for 17 other units. In the June, 1918, opening the lands were arranged into 60 units. Fourteen applications were filed for three of these units. In each case the priority of right of filing was determined by lot. Owing to the high prices placed on the land and timber the number of applicants for these lands was not large.

On April 30, 1918, regulations were approved for the opening to entry of a quarter section of land within the former Fort Berthold Indian Reservation in North Dakota. The land had formerly been reserved for the townsite of Smith. Sixty-eight applications were filed, and Hannah K. Kjelstrup, of Parshall, N. Dak., drew No. 1. The land was appraised at $12.50 per acre, or $2,200 for the tract.

By President's proclamation of March 14, 1918, 88,685.09 acres of land within the former Fort Peck Indian Reservation, Mont., which had been classified and appraised without regard to the coal deposits therein, were opened to entry, with reservation to the Government of the coal deposits. The lands were appraised at from $3 to $10.50 per acre. The lands were designated by units and were made subject to homestead application by said units from April 8 to 20, 1918, with a drawing on April 23 to determine the priority of disposition in the case of conflicting applications. On June 1, 1918, the lands became subject to settlement, as well as to homestead and desert-land entry, without regard to such units, and to petition for designation under the enlarged and stock-raising homestead laws.

About 150,000 acres of lands within the former Fort Berthold Indian Reservation, N. Dak., formerly classified as noncoal lands, were reclassified as coal lands during the past year, and, under departmental instructions of November 16, 1917, on entries for these lands allowed prior to the coal classification, patents issue without any reservation of the coal; but on entries allowed subsequent to the coal classification patents are to issue with a reservation of the coal deposits to the United States under the act of February 27, 1917 (39 Stat., 944).

An important ruling was made during the past year, involving the question of suspended applications for Indian land which had not been appraised for its agricultural value preparatory to its opening to homestead entry. The land was in the Colville Indian Reservation, Wash., classified as timber land. Claude H. Carlson submitted a homestead application for a tract of this timber land, and at the same time applied for a reclassification of the land, claiming it was agricultural in character, and asking that his application be suspended pending reclassification of the land. His application was rejected on the ground that the land was not subject to homestead entry, and this holding was sustained by the department on appeal. The department further held that no preference rights are acquired by filing petitions for the reclassification of both timber and mineral lands in said reservation, and that the homestead applicant for such land whose application is rejected because the land is not subject to entry is entitled on appeal only to a judgment as to the correctness of the action at the time it was taken, in accordance with the decision in the case of Hendricks *v.* Damon (44 L. D., 205). The matter of suspended applications has been a troublesome one in connection with openings of Indian lands. For a time the local officers were permitted to receive applications for lands not subject to entry and suspend them pending the classification and appraisement of the lands. This led to confusion and conflict of rights, and in many cases was detrimental to the applicant, as there was always a doubt as to whether or not he would get the land, and usually there was a long delay before the lands were opened, and his activities in other directions were interfered with. Therefore, for several years past, an endeavor has been made to discontinue entirely the practice of suspending applications for lands which are not subject to entry and of substituting in place thereof the practice of rejecting such applications. The latter practice was approved by the department in the ex parte case of William Marquardt, in which it was held that until the lands (Indian) are appraised they are not subject to entry under the act providing for their disposal, and there is no authority for receiving and suspending a homestead application therefor.

The method adopted during the past year for opening tracts classified and appraised subsequent to the regular opening of an Indian reservation has been in conformity with the regulations of May 22, 1914 (circular No. 324, 43 L. D., 254). Applications to enter the lands may be filed during a certain period, and these applications are treated as filed simultaneously and disposed of according to said circular. Where there are conflicting applications, the prior right of entry is determined by a drawing. The lands become subject to settlement and entry generally seven days after the lands become subject to simultaneous applications.

The Supreme Court of the United States rendered a decision on March 4, 1918, which affected about 64,000 acres ceded by the Spokane Indians, and to be disposed of for their benefit, and the claims of 28 homestead settlers. The Northern Pacific Railway at the time of the opening of the Spokane Indian Reservation in the year 1910 claimed certain odd-numbered sections under the grants made to it by the acts of May 2, 1864 (13 Stat., 365), and May 31, 1870 (16 Stat., 378). The facts are that the railroad was definitely located through said reservation on October 4, 1880. Prior thereto, however, viz, in 1877, an Indian inspector had, pursuant to an agreement with the Indians, located them upon the reservation in question, and the Indians were residing thereon at the date of the definite location of the railroad. The Executive order setting apart the lands as an Indian reservation was issued January 18, 1881. This department denied the right of the railway company to select the lands, holding that they were in a state of reservation at the time of the location of the railroad. The company brought suit in the courts, the case being entitled Northern Pacific Railway Co. *v.* Wismer. In its decision the Supreme Court held that the reservation was in fact made and the lands exclusively devoted to the use of the Indians from the date of the agreement made with them by the Indian inspector in August, 1877. Most of the lands claimed by the railway company are heavily timbered, and these lands are reserved for future disposition by Congress.

An application to have a tract in the Fort Hall Indian Reservation, Idaho, designated under the enlarged homestead act of June 17, 1910 (36 Stat., 531), was rejected by this office. On appeal the department on May 14, 1918, affirmed said action, and held that section 5 of the act of June 6, 1900 (31 Stat., 672), under which said lands were opened, specifically limits entry thereof to 160 acres, and that under the circumstances the departmental instructions of January 7, 1915 (43 L. D., 508), were controlling.

EXTENSION OF TIME FOR PAYMENT ON INDIAN LANDS.

On November 20, 1917, the department approved instructions to the district land offices by which an entry for land formerly embraced in an Indian reservation, for which payment is required of a certain price per acre for the benefit of the Indians, and the entryman thereafter entered or shall enter the military or naval services of the United States, shall not be canceled on account of failure on the part of the soldier or sailor to make the payments falling due during the term of enlistment, but the entry will be held suspended pending consideration by Congress of legislation designed to extend the time for such payment beyond the period of military service or the existing war.

Section 501 of the act of March 8, 1918 (Public, No. 103), known as the soldiers' and sailors' civil relief act, provided the legislation in question, and the regulations thereunder dated May 16, 1918 (circular No. 600), directed that—

> As said act of March 8, 1918, operates to grant such extension, no entries will be canceled upon the ground indicated above until the expiration of six months after the end of the war and after the discharge of the entryman from the service, unless such discharge shall have occurred at an earlier date, in which case said six-month period shall begin to run from the time of his discharge.

TOWN-SITE, TOWN-LOT, AND KINDRED ENTRIES.

Notwithstanding the existence of conditions tending to divert the energies and industries of the country into channels other than those of town improvements and settlements, there appears to be no diminution in the demand for town lots in Government town-sites. Many settlements have been made in the old towns, and new towns have been created on Government lands, thus indicating a prosperous and growing condition of the country.

Twenty town-site and kindred entries were received during the year, amounting, with the 13 pending at the beginning of the year, to 33, of which 29 have been approved for patenting, leaving 4 pending. The pending lot entries (54) and 1,719 received during the year aggregate 1,773, of which 1,661 were approved for patenting and 112 are pending.

Town-site lots in Indian reservations and in reclamation projects have been sold at public sale on the installment plan, and memorandum certificates have been issued to cover such sales pending final payment and the issuance of certificate of entry. The same practice has been observed in some other town sites, and such practice appears to be commendable. There were on hand at the close of the year 840 memorandum certificates of such lot sales. The following list shows the towns in which public sales of lots have been made during the year, in which reservations or projects located, lots sold, and the sale price:

IN FORMER INDIAN RESERVATIONS.

Name of town.	State.	Reservation.	Lots sold.	Sale price.
Timber Lake	South Dakota	Cheyenne River	198	$10,219
Dupree	do	do	25	2,432
Duchesne	Utah	Uintah	219	5,095
Inchelium	Washington	Colville	97	3,465
Yellow Bay	Montana	Flathead	27	905
Big Arm	do	do	17	397
Camas	do	do	62	1,578
D'Aste	do	do	41	647
Tabor	do	do	4	222
Pablo	do	do	8	666
Batesville	North Dakota	Fort Berthold	102	2,918
Sanish	do	do	11	904
Wolf Point addition	Montana	Fort Peck	180	15,745
Parker	Arizona	Colorado River	51	3,196

IN RECLAMATION PROJECTS.

Name of town.	State.	Reservation.	Lots sold.	Sale price.
Powell	Wyoming	Shoshone	57	$11,082.00
Deaver	do	do	91	29,380.00
Heyburn	Idaho	Minidoka	42	12,430.00
Rupert	do	do	7	5,075.00
Newell	South Dakota	Bellefourche	43	6,210.00
Bowdoin	Montana	Milk River	131	40,165.00
Cedarvale	New Mexico	Under sections 2380 and 2381.	37	243.50

Total number of lots sold, 1,450, for $152,974.50.

Unappropriated Government lands in many reclamation project town sites have been withdrawn in order that the same might be temporarily leased from year to year for agricultural purposes to increase the crop production.

A survey of Hot Springs town site, New Mexico, has been ordered and is now being made under section 2384, United States Revised Statutes. The hot springs in this town site are claimed to be of value for their medicinal properties.

There also appears to be a growing demand for special legislation authorizing the entry of land by municipalities for park and water supply purposes. Some general legislation authorizing such entries and also authorizing entry of public land for villa sites, summer homes, hotels, health and pleasure resorts, appears to be desirable.

TOWN SITES IN ALASKA.

Circular No. 491 has been amended so as to permit the natives of Alaska who have become citizens under the territorial law to acquire title to lots occupied by them in town sites; and circular No. 491 has also been amended, authorizing the conveyance of title to lots in town sites to persons in occupation thereof on date of final subdivisional town site survey.

The town site of Eska, near the Matanuska coal fields, has been surveyed into lots and blocks, and the public sale of the lots will soon be held. Land has been withdrawn for three more town sites along the Government railroad in Alaska. The other town sites along said railroad appear to be in a prosperous condition.

The chief of Field Division in Alaska, acting as trustee for Wrangell, Douglas, and Haines town sites, is proceeding rapidly with the execution of his trust, patents having been issued to him in the three town sites. The town site of Petersburg has been surveyed into lots and blocks, and the chief of Field Division has been appointed trustee for that town site, and he is proceeding in the administration of his trust.

ABANDONED MILITARY RESERVATIONS.

The reservation at Bayside, known also as Point Comfort, comprising nearly 26 acres in Monmouth County, N. J., has been surveyed and appraised, but the survey has not yet been accepted. The survey of Batton Island, situated at the mouth of St. Johns River, south of St. Georges Island, not far from Jacksonville, Fla., has been accepted. The lands have been appraised and will probably be offered at public sale to the highest bidder for cash, as provided in the act of July 5, 1884 (23 Stat., 103), during the coming winter. Virginia Key, located near Miami, Fla., was surveyed and appraised preparatory to its disposition under the act of July 5, 1884, supra. The reservation contained 66.12 acres, situated in T. 54 S., R. 42 W., Tallahassee meridian. It appears, however, that the lands had been used for target practice by the naval air station of Miami, and as it was desired to continue said activity, the lands in said reservation were, by Executive order of August 13, 1918, reserved for the sole use of the Navy.

On August 22, 1917, a military reservation, situated on the north side of the entrance to Gig Harbor, narrows of Puget Sound, within 10 miles of the city of Tacoma, Wash., comprising 77.80 acres, was turned over to this department for disposition under the act of July 5, 1884 (23 Stat., 103). These lands when turned over were in the possession of lessees and sublessees, under revocable leases given by the War Department. House bill 8749, pending in Congress, proposes to allow the occupants under said leases to purchase the tracts occupied by them at not less than an appraised price.

There are two other reservations, Nos. 23 and 24, comprising 1,239.20 acres, situated on the Narrows, not far from Tacoma, Wash., which have been surveyed preparatory to their disposal under the act of July 3, 1916 (39 Stat., 342), certain settlers being given a preference right to enter the tracts settled on, not exceeding 20 acres. The plats of survey have not yet been prepared and filed. Fort Sabine, comprising land in Cameron Parish, La., has been surveyed, but the survey has not yet been accepted. The lands are yet to be appraised. A part of this reservation is also needed for a target range by the United States Coast Guard.

There are also 10 small reservations in the State of Louisiana, comprising 6,172.79 acres, which have been surveyed and appraised preparatory to their disposition under the act of July 5, 1884 (23 Stat., 103). The offering of the lands for sale, however, is suspended pending proposed legislation, granting the lands to the State.

The lands in the Three Forks Owyhee Reservation, embracing 4,875.53 acres in Idaho and Oregon, have been surveyed and appraised, and will probably be offered at public sale under the act of July 5, 1884, during the coming year.

The Fort Grant Reservation, Ariz., comprising 9,036.41 acres, outside of the Graham National Forest, has been surveyed and appraised, and further action is suspended awaiting report as to the character of the lands. The lands will probably be offered during the coming year.

About 440 acres, withdrawn for a military road in connection with Fort Bayard, N. Mex., have been appraised, with a view to public offering under the act of 1884. The appraiser, however, reports that the lands are mostly mineral in character.

The act of February 20, 1917 (39 Stat., 926), granted to the city of St. Augustine, Fla., the old powder house lot, including the Hedrick lot. There appears to have been three surveys of the land involved, none of them by this office, and a survey on the ground is therefore necessary, in order to obtain an accurate description of the land to be conveyed.

INDIAN ALLOTMENTS.

On April 15, 1918, the department approved regulations governing the location of Indian allotments on the public domain under section 4 of the act of February 8, 1887 (24 Stat., 388), as amended, known as the general allotment act. By this act, Congress sought to encourage individual Indians to break away from the tribal mode of life and to become self-sustaining occupants of land for farming and grazing purposes. Under these regulations an Indian, desirous of obtaining nonreservation land under said allotment act, must first obtain a certificate from the Commissioner of Indian Affairs that he or she is entitled to an allotment. This certificate must be filed at the proper United States district land office, together with an application for the land on which the applicant has settled, which operates to segregate the land. Applications can also be filed for such minor children, either by blood or those to whom the settler stands in *loco parentis*, as are in being at the time the parent files application.

An Indian woman whose husband has received an allotment on the public domain is not entitled to take an allotment for herself or for her children dependent on her, even if she is separated from her husband. Where, however, an Indian woman is separated from her Indian husband, who has not received an allotment under the fourth section of said act of February 8, 1887, she will be regarded as the head of a family and entitled to file an application for herself and for the minor children under her care, provided she is an actual settler on the land applied for. The right of an Indian woman, married to a white man, and of the children born of such a marriage to allotment under said fourth section, is to be determined with reference to their recognition as members of an Indian tribe, or their right to such recognition, and also with reference to the matter of settlement. If, by reason of her marriage to such white man, she is prevented from complying with the terms and conditions of said law as to settlement, she can not file application for herself or for her minor children. If such husband is not a settler or entryman under the general homestead law, she will be regarded as the head of a family and entitled to an allotment in her own name, and for her minor children, upon compliance with the law in the matter of settlement.

In the new regulations, effort has been made to secure some little tangible beneficial use and occupancy of the land by the Indian. In the past, so much consideration has been given to the "nomadic character of the race" that in too many instances the connection between the Indian and the allotment has been so remote as to be scarcely discernible. While every opportunity should be given the progressive Indian to get a start in civilized life and individual property, the loose practice that has prevailed has done the Indian no good and has deprived others of the privilege of making real beneficial use of the lands.

Pending the approval of said regulations, over 6,000 applications by Indian settlers, for themselves and their children, have accumulated. As the law is now interpreted, these Indians must show two years of actual use of the land, in order to establish their good faith in making settlement, before the trust patents authorized by law are issued.

The practice of the department in having patents in fee issued to Indians as fast as they show evidence of being capable of looking after their own interests has resulted in a great decrease of the amount of lands held in trust by the United States and corresponding increase in the area taxable by the State authorities. During the past year, 3,952 Indian trust patents, embracing 1,089,765.62 acres, were issued, as against 5,839 trust patents, embracing 945,874.73 acres, the previous year. There were not so many trust patents issued the past year, but they were for lands in reservations in some of which the Indians were entitled to take 320 acres or more each. There was a decided increase in the number of fee patents issued. During the past year 4,974 of such patents, embracing 726,969.81 acres, were issued, as against 2,014 fee patents, for 246,230.16 acres, the previous year.

RAILROAD GRANTS.

Railroad and wagon road selections were received during the year to the amount of 665,372.49 acres, as against 986,596.05 acres in 1917.

There were patented 943,339.78 acres as against 1,586,807.98 acres patented in 1917, the decrease being due largely to press of other work, particularly on the Oregon and California grant lands, necessitated by the act of revestment, June 9, 1916 (39 Stat., 218).

One grant, that of the Corvallis & Yaquina Bay Wagon Road Co. in Oregon was finally adjusted and closed as provided for in the act of February 11, 1913 (37 Stat., 666), and there are four other grants that are practically adjusted and only awaiting minor actions.

The suits mentioned in the report of 1917, of the Central Pacific and Northern Pacific Railway Co.'s to test the right of the Government to withdraw from disposition lands within the railway indemnity limits included in pending unapproved indemnity selections, and of the Northern Pacific Railway Co. to determine what constitutes a mineral classification under the act of March 2, 1899 (30 Stat., 993), are still pending in the courts.

The limit of time within which selections could be filed by the railroads in California, Arizona, and New Mexico under the act of March 4, 1913 (37 Stat., 1007), as extended by the act of April 11, 1916 (39 Stat., 48), in lieu of land occupied by Indians expired March 4, 1918, but upon request of the Indian Office, House bill No. 11714 was introduced April 26, 1918, extending the time to March 4, 1920, but no final action has yet been taken thereon.

The act approved February 27, 1917 (39 Stat., 946), extends the provisions of the act of July 1, 1898 (30 Stat., 597), relative to the adjustment of conflicting claims to Northern Pacific Railway lands to unsurveyed primary limit lands in the State of Washington, settled upon prior to July 1, 1913, the lands selected in lieu thereof to be within the State of Washington. Regulations under this act were approved April 28, 1917 (46 L. D., 98), but the company has refused to accept the terms of the act. While there has been quite a number of applications filed by individuals for adjustment of their claims under said act, no demand has been made upon the railroad, as practically all such applications cover lands the reconveyance of which has been demanded under the act of July 1, 1898, and refused by the company, and, under the regulations, no demand in such cases is made under the amendatory act. Under this procedure the settler can secure relief only to the extent of taking other land in lieu of that settled upon by him.

OREGON AND CALIFORNIA RAILROAD LANDS.

The act of June 9, 1916 (39 Stat., 218), revested in the United States all the lands patented to the Oregon & California Railroad Co. under its grant, and the lands to which it was entitled to receive a patent under said grant remaining unsold July 1, 1913.

The history of this grant and the proceedings instituted in the Federal courts for its annulment for failure to comply with the conditions attached thereto leading up to the decision of the United States Supreme Court of June 21, 1915 (35 Sup. Ct. Rep., 908), and the resulting act of revestment above cited, is fully set forth in my annual report of 1917, together with a statement in detail as to proceedings taken in accordance with said act for the restoration and disposition of the lands affected thereby.

The lands thus returned to the United States are, by said act, to be examined in the field and classified in accordance with their chief value, as power-site lands, timberlands, or agricultural lands, and be disposed of in accordance with such classification, though in the case of lands classified as "timberlands," the timber is to be sold separate and apart from the land, which after the removal of the timber will become subject to homestead entry. Provision is also made in said act for the payment to the several counties in the State of the unpaid and accrued taxes due on the lands, title to which has been revested in the United States.

The proceeds of these lands thus returned to the public domain, after reimbursement to the United States of all proper charges, will be divided between the State and the United States in such manner that the State will receive 50 per cent; of the remainder, 40 per cent will be paid into the general reclamation fund and 10 per cent into the general funds of the Treasury.

Classification.—The area returned to Federal ownership has been stated approximately at 2,300,000 acres, but these figures are somewhat below the present estimate, for to the "decree lands," 2,076,326 acres, which are the unsold patented lands mostly in primary limits, must be added about 308,000 acres of unsold, unpatented lands in both primary and indemnity limits, to which the company is apparently entitled to a patent, though that area will be reduced to the extent that the lands are found to be mineral in character. Up to the end of the fiscal year reports have been received in the General Land Office showing the classification of over 1,600,000 acres as timber lands or agricultural lands; these figures, however, not including a large area of field work not yet reported. The lands classified as powersite by the Geological Survey, in charge of this branch of the work, approximate 112,000 acres.

Restoration.—In pursuance of the policy theretofore announced by the department, provision was made for the opening of agricultural lands as soon as any considerable acreage of such lands became available by classification; so that on March 19, 1918, under appropriate regulations, some 300,000 acres of land were opened to homestead entry in the Roseburg, Oreg., land district, and on May 11, 1918, about 150,000 acres were thus opened to entry in the Portland, Oreg., district.

In the restoration of these lands to entry, considerable of a departure was made by way of giving the public specific information as to the character of the land. We were able to do this for the reason that the classification, in accordance with the terms of the act, required a cruise and report on each 40-acre tract of land. In both of the openings referred to above, a circular of information was printed, devoting a line to each 40-acre tract, on which was indicated, description, area, topography, character of the land, presence of water, the amount of timber on it, and nearness to towns, wagon roads, and railroads. A map was also provided showing the tracts open to entry, by which the settler would be enabled to locate the lands he desired.

Sale of timber.—In the disposition of timber on lands classified as timber lands, section 4 of the act of revestment provides for sales "at such times, in such quantities, and under such plan of public competitive bidding as in the judgment of the Secretary of the Interior may produce the best results." The Oregon and California timber lands, for the most part, are rough and rugged, if not actually mountainous in character, requiring large expenditures in the way of logging railroads and similar equipment to successfully cut and remove the timber, all of which involves a heavy expenditure. This condition has led to a plan of offering for sale the timber on small bodies of land, classified as timber land, that are practically isolated from lands of similar character revested in the United States, but are in the immediate vicinity of timber lands in private ownership where logging operations are in progress. By this plan, advantage is taken of a present market for the timber on these tracts, whereas if opportunity for such sales were allowed to pass it might be many years before the Government would be able to sell the timber at a fair estimate of its value. Regulations in accordance with this policy were approved by the department September 15, 1917, under which patents have issued during the fiscal year, for the timber on 4,197.89 acres, for which there has been received the sum of $145,888.28. The sales provided for under this policy will be strictly limited to the timber on isolated tracts.

Exchange of timber lands.—As the grant to the company was of odd-numbered sections, and it had, prior to the act of revestment, sold some of the granted lands to lumber companies and others, who also held the title to the even-numbered sections, it follows that the United States now has title to the revested odd-numbered sections, while the title to the even-numbered sections within the grant limits, as well as the odd-numbered sections sold prior to July 1, 1913, is now in private ownership. This scattered holding of timberlands by the United States seriously interferes with the advantageous disposition of the timber, for the reason that the lands are for the greater part, as heretofore noted, rough and mountainous, calling for a heavy initial outlay before successful logging operations can be set on foot, as well as a corresponding expenditure to maintain such operations. Therefore, successful operations in this region call for the ownership of timberlands in large bodies, and prices paid for timber will be to a large degree affected by the possibilities of thus blocking up timberlands for future operations. For these reasons the department recommended legislation authorizing the Secretary of the Interior to consolidate the present holdings, under the act of revestment, with lands adjacent thereto, now held in private ownership, and thus be enabled to offer for sale, in single blocks, large bodies of timber, eliminating thereby the advantage at public sale now held by the owners of adjacent lands. As a result of this recommendation we now have the act of May 31, 1918 (Public No. 162), conferring upon the Secretary of the Interior ample authority for the exchange of timberlands for those in private ownership where, by such action, he will be enabled to consolidate advantageously the timberland holdings of the United States. Regulations under this act received your approval July 17, 1918.

Taxes.—The payment of taxes on the revested lands is governed by section 9 of the act which provides that—

> The taxes accrued and now unpaid on the lands revested in the United States whether situated in the State of Oregon or State of Washington, shall be paid by the Treasurer of the United States, upon the order of the Secretary of the Interior, as soon as may be after the approval of this act, and a sum sufficient to make such payment is hereby appropriated out of any money in the Treasury not otherwise appropriated.

Promptly after the passage of this act, a special officer was designated by the department to act in conjunction with the field division at Portland, Oreg., in the ascertainment of the taxes due the several counties traversed by the grant. A full schedule of the taxes claimed by the several counties was thus secured and placed on file in this office. Payment, however, was necessarily suspended during the pendency of an appeal by the railroad company from the decree entered in the United States District Court under the decision of the Supreme Court, which also involved the constitutionality of the act of revestment. The decision of the court, however (37 Sup. Ct. Rep., 443), fully upholding the validity of this act, action was resumed in the matter of payment.

The revested lands on which the taxes are to be paid under the section above cited fall into three classes:

(1) Surveyed patented lands unsold July 1, 1913.

(2) Patented lands, embraced within contracts of sale by the company, canceled, or in default July 1, 1913.

(3) Surveyed unpatented lands, in primary limits, for which the company is entitled to receive patents and unsold July 1, 1913.

On your order of September 20, 1917, Treasury warrants issued October 2, 1917, for the sum of $1,504,841.60, in payment of the taxes in class 1. By your letter of July 31, 1918, the Secretary of the Treasury has been requested to issue Treasury warrants for $25,105.97, in payment of the taxes in class 2.

There remains, for ascertainment and payment, the taxes due in class 3, which must await further adjustment of the grant.

Adjustment.—Inasmuch as the act of revestment returned to the United States all the lands patented to the company under its grant, and the lands to which it was entitled to receive a patent under said grant, remaining unsold July 1, 1913, for which the company is to receive $2.50 per acre, the proper administration of the act requires the full and final adjustment of the grant in all particulars, which, among other things, calls for a survey of approximately 182,000 acres in the primary limits, and indemnity limits outside of forest reserves, not surveyed at the passage of the act; of these lands 102,000 acres have been surveyed up to the present time. The examination in the field of odd-numbered sections apparently subject to the grant to ascertain their mineral or nonmineral character is also necessary for the grant excluded mineral lands therefrom except coal and iron; and from the examination thus far made it appears that approximately 55,800 acres are found to be mineral, and the company has been served with notice of proceedings alleging the mineral character of such lands and their consequent exclusion from the grant; while 197,000 acres have been clear listed as nonmineral.

The status, however, of the odd-numbered sections within the indemnity limits embraced within national forests, amounting in the aggregate to some 472,000 acres, of which 318,000 acres are unsurveyed, is such that under the present rulings of the department the right of selection thereof by the company is defeated. This question has been made the subject of litigation, and is involved in the case of Northern Pacific Ry. Co. *v.* Franklin K. Lane, pending in the Court of Appeals, District of Columbia, where the right to include, within a reservation for forest purposes, the lands embraced within the indemnity limits of a railway grant and so defeat the right of selection is called in question.

If the position taken by the department is upheld in the courts, the Oregon & California Railroad Co. will secure no right to indemnity land embraced within national forests, and no present purpose will be subserved by the survey or classification of such lands, and for this reason, until the judicial determination of the status of indemnity lands within forest reserves, no action will be taken looking toward their disposition under the grant; these lands, however, form no part of the 2,300,000 acres formerly referred to herein.

COOS BAY WAGON ROAD LANDS.

By the act of March 3, 1869 (15 Stat., 340), a grant of lands was made to the State of Oregon to aid in the construction of a military wagon road from Coos Bay to Roseburg, Oreg. This grant was conferred by the State upon the Coos Bay Wagon Road Co.

Section 1 of the granting act contains the following proviso:

> *Provided further*, That the grant of lands hereby made shall be upon the condition that the lands shall be sold to any one person only in quantities not greater than one quarter section and for a price not exceeding $2.50 per acre.

Under the authority of joint resolution, dated April 30, 1908 (35 Stat., 571), suit was instituted by the Attorney General against the Southern Oregon Co. as the successor in interest, to secure a forfeiture of the grant as to about 96,000 acres of land disposed of in violation of the proviso to section 1, above quoted. A decision was rendered in said case by the United States district court on July 15, 1915, favorable to the United States, along the lines of the decision of the United States Supreme Court, dated June 21, 1915 (238 U. S., 393), in the suit instituted against the Oregon & California Railroad Co. On appeal, the decision of the lower court was affirmed by the United States Circuit Court of Appeals for the Ninth Circuit on February 13, 1917 (241 Fed., 16). On August 31, 1917, the Attorney General reported that an appeal had been taken to the United States Supreme Court, where the case is now pending.

In the event that the suit finally terminates in favor of the United States, it is probable that legislation will be required for the disposition of said lands similar to the act of June 9, 1916 (39 Stat., 218), providing for the disposition of the Oregon & California Railroad lands. Pending final determination of the suit, however, the lands will not be subject to settlement, entry, or the acquisition of any rights under the public land laws of the United States.

A new turn has been given to this matter, however, by the introduction of two bills in Congress (S. 3436 and H. R. 8625), identical bills, to authorize the acceptance, on behalf of the United States, of a reconveyance from the Southern Oregon Co. of the lands granted to aid in the construction of this road, on condition that payment be made to the company of the sum of $232,463 ($2.50 per acre), and the taxes due said county, amounting with interest, penalties and costs, at the present time, to $408,846.

Further provisions of the bill authorize in general terms the disposition of the lands in accordance with the act of revestment under which the Oregon and California land grant was restored to the United States, and provide, after reimbursement of the United States for the sums above mentioned, for the distribution of the net proceeds as follows: Twenty-five per cent to be paid to the State Treasurer of the State of Oregon, as a part of the irreducible school fund of the State; 25 per cent to the county in which the lands sold are situated, for schools, roads, highways, etc.; 40 per cent to be paid into the general reclamation fund of the United States, and the remainder into the Treasury of the United States.

STATE SELECTIONS AND STATE GRANTS.

State selections aggregating 2,305,676.35 acres received departmental approval during the past year; 1,611,764.38 acres of indemnity school-land selections and 693,911.97 acres of selections under grants in quantity for specific purposes. In addition to the approvals, 24,743.39 acres of indemnity school-land selections and 3,391.93 acres of specific grant selections were canceled, the acreage finally adjudicated being 2,333,811.67. There were 4,727.78 acres of selections approved with reservation of coal to the United States under the provisions of the act of March 3, 1909 (35 Stat., 844), 82,518.69 acres of selections with like reservation under the provisions of the act of June 22, 1910 (36 Stat., 583); 3,985.33 acres with reservation of oil and gas, and 97,725.56 acres with reservation of phosphate under the provisions of the act of July 17, 1914 (38 Stats., 509). Cooperative agreements have been entered into between some of the States and the United States, under which school section land within the boundaries of national forests may be exchanged for other lands within national forest boundaries, the land selected by the States, upon confirmation of title, being eliminated from the forests. Pursuant to such agreements 133,329.60 acres of land have been certified during the past year, holdings of the United States and of the States being consolidated to that extent.

Many old as well as recent reports have been examined. In no fiscal year have adjudications of State selections been found equaling in acreage those in the year just past. For example, it is found that 22,974.59 acres of State selections were approved in 1881, 1,237,070.50 acres in 1895, and in 1908, when the specific quantity grants to the State of Oklahoma were adjudicated in large part, 2,266,860.59 acres. During the fiscal year 1917, 1,233,926.01 acres of State selections were finally adjudicated, and 1,145,167.02 acres in 1916.

Indemnity school-land selections aggregating 1,179,544.14 acres, and selections embracing 79,861.95 acres under specific quantity grants were filed during the past year, thus showing that the States are actively asserting claims to public lands under congressional grants. While feeling that much has been done looking to the adjustment of these grants, much remains to be done, the records indicating that there are some 5,000,000 acres of pending unadjudicated selections.

THE OREGON ADJUSTMENT.

As stated in my report for 1917, it is sometimes found, in the adjustment of the school-land grants of the several States, that a State has received indemnity lands to which it is not entitled, the State being then requested to make good the overdraft. During the past year an adjustment of the Oregon school-land grant, the overdraft amounting to some 6,000 acres of land, was completed in large part, the officials of the State cooperating most heartily and effectively in securing the adjustment.

THE SWEET DECISION.

The statute making a grant of designated sections of land to the State of Utah for public school purposes (act July 16, 1894; 28 Stat., 107) does not expressly exclude nor include mineral lands. The Supreme Court of the United States on January 28, 1918, in the case of the United States *v.* Sweet (38 S. C. Rep., 193), decided that title to lands in such designated sections of known mineral character at the time the grant would become effective, if at all, did not pass to the State; that, as theretofore held in similar cases, the grant of school lands, in place, to the State of Utah must be read in the light of the mining laws, the school-land indemnity law, and the settled public policy respecting mineral lands. This decision emphasizes anew a condition existing in several of the States to which the attention of Congress has been heretofore directed, but thus far no relief has been provided.

The title to the designated sections, in so far as mineral deposits therein are concerned, depends upon the known character of the lands at date of grant, as to lands then surveyed, and at date of the acceptance of the survey by the Federal Land Department, as to lands unsurveyed at date of grant. But a grant of this character calls for no further evidence of title, as the statute in such case is both a grant and a conveyance, so far as the lands are of the character granted and otherwise subject thereto. It is apparent, therefore, that in the absence of some provision by which the known condition of the specified sections, at the date when the grant takes effect, can be ascertained, the title of the State must remain in doubt. If the State in such a case sells and conveys such lands to purchasers, as it did in the Sweet case, the title so taken may be defeated on proof of the known mineral character of the land when the grant became effective, as it was in the Sweet case. To meet this condition, so far as such grants have been heretofore identified by survey, Congress should, by appropriate statute, authorize a patent to the purchaser in good faith from the State, with a reservation of the mineral therein to the United States, if he so elect, or a patent without such reservation on the payment of the appraised value of the land.

As to lands not yet identified by survey, the procedure now in force in connection with the surveys in the field, and their subsequent approval, it is believed, will serve to effectually remove uncertainty of title under school grants so far as affected by mineral deposits.

SWAMP AND OVERFLOWED LANDS.

An opinion of far-reaching consequence affecting swamp-land claims, was rendered by the department on May 25, 1918, in which it was held that mineral lands were not included within the scope of the swamp-land grant and should not be patented thereunder. It is necessary, therefore, not only to ascertain the character of land, whether swamp or upland, but also with respect to mineral deposits, in all cases of claims asserted under the swamp-land grant to lands in place, in States wherein the public mineral land laws apply.

The governor of Wisconsin, in view of the decisions of the United States Supreme Court, rendered on January 7, 1918, in the case of the State of Wisconsin *v.* Franklin K. Lane, and the United States *v.* The J. S. Sterns Lumber Co. (38 S. C. Rep., 135–137), holding the school land grant defeated, so far as in conflict, by the reservation made for the use of the Menominee Indians, on April 12, 1918, transmitted to the department a copy of a resolution adopted on April 11, 1918, by the commissioners of the public lands of that State, which relinquished all claim to the swamp lands, and to the timber growing thereon, within the Bad River Indian Reservation. Such lands were listed in Ts. 46 and 48 N., R. 2 W., and Ts. 46, 47, and 48 N., R. 3 W., 4th P. M. The State's swamp-land claim thereto was, therefore, finally rejected by this office on June 21, 1918, the acreage involved being 12,482.99.

In some of the swamp-land States, notably in Louisiana, many sales of lands have been made by the State after tracts were merely embraced in preliminary selection lists made by the United States surveyor general but before the claim was approved by the Secretary of the Interior as the grant requires. Indeed, in some cases, lands so sold were not even claimed by the State as swamp, in any application that is in the files of this office. Such sales have led to many annoying and expensive contests of State claimants with homestead settlers and to much trouble for all concerned in the administration of this grant. In view of this fact, and in order that stability of title may be assured, I recommend the enactment of remedial legislation permitting the transferees of the several States to buy from the United States, at the minimum price for public lands, all tracts of the class and character subject to entry under the agricultural land laws of the United States, so purchased from the States and the sale evidenced by State deed or patent, prior to January 1, 1910, and which have been actually occupied—that is, put to some beneficial use and not merely held in speculation—with provision that if the lands are claimed adversely under the provisions of the homestead laws, the homestead claimant be compensated by the State's transferee for any improvements he may have placed thereon, the amount to be paid for improvements to be fixed by the Federal land department, and further that the provisions of existing law relative to acquisition of surface title only be held applicable to such purchases.

During the past fiscal year swamp-land patents issued for 25,571.78 acres of land; claims aggregating 90,325.98 acres were rejected, and new claims for 3,027.31 acres were filed.

The total number of acres conveyed to the several States which were the beneficiaries of the grant of swamp and overflowed lands made by the acts of March 2, 1849 (9 Stat., 352), September 28, 1850 (9 Stat., 519), and March 12, 1860 (12 Stat., 3), now sections 2479, 2480, 2481, and 2490 United States Revised Statutes, is 64,258,731.04 acres, distributed as follows:

Alabama	418, 520. 14
Arkansas	7, 686, 335. 37
California	2, 138, 745. 76
Florida	20, 201, 660. 52
Illinois	1, 457, 399. 20
Indiana	1, 254, 270. 73
Iowa	873, 816. 42
Louisiana	9, 735, 766. 66
Michigan	5, 655, 769. 56
Minnesota	4, 662, 927. 10
Mississippi	3, 284, 972. 56
Missouri	3, 346, 683. 70
Ohio	26, 251. 95
Oregon	264, 069. 01
Wisconsin	3, 251, 542. 34
Total	64, 258, 731. 04

In addition to swamp lands in place, 79.95 acres were patented last year to Florida and 365.89 acres to Louisiana as indemnity for swamp lands which had been located by settlers with military bounty land warrants or scrip prior to the act of March 3, 1857 (11 Stat., 251), now section 2484, United States Revised Statutes. The total of swamp-land indemnity lands patented is now 744,385.23 acres, while cash indemnity for $2,095,466.70 has been paid for swamp lands sold to settlers prior to said act.

In previous reports I have called attention to the fact that the swamp grant has not been so employed by the States as to secure the drainage of the great body of lands actually granted, that in many cases the proceeds from the sales of the lands were used for other purposes; also, to the increasing difficulty of adjudicating claims through the lapse of time, and recommended that legislation be enacted declaring that after a date fixed, preferably six months after the passage of the act, no new claim to swamp and overflowed lands be received or recognized by the Land Department, and, for the reasons thus stated, I renew this recommendation.

NATIONAL FORESTS.

Since the issuance of my last annual report one national forest, the Dakota, in North Dakota, has been abolished, three national forests have been enlarged, and 18 reduced under the act of June 4, 1897 (30 Stat., 34, 36); one national forest, the Alabama, has been established, partly of public lands and partly of lands acquired by the United States under the provisions of the act of March 1, 1911 (36 Stat., 961), and three national forests have been created wholly of lands acquired under said act; in all 86,460 acres of public lands have been added to national forests. Certain interforest transfers have been made and several consolidations of national forests under one administration and name have been effected.

There are now 151 national forests, embracing 175,951,266 acres, of which area approximately 88 per cent is public land. The net decrease in national forest area since the beginning of the fiscal year is 300,894 acres. During the fiscal year 1,027,418 acres have been excluded from national forests, 77,033 acres thereof withdrawn for certain public purposes, and the public lands subject to disposition in the remaining 950,385 acres and in 13,101 acres released from temporary forest withdrawal have been restored to entry and other disposition. Under the provisions of the act of June 25, 1910 (36 Stat., 847), 77,866 acres have been withdrawn in aid of pending legislation, to include the lands in certain national forests or to authorize selection thereof in exchange for privately owned lands within national forest boundaries.

During the fiscal year two administrative stations, embracing 396 acres, have been withdrawn by executive orders under the act of June 25, 1910, supra, for use by the Forest Service in the administration of certain national forests, and 13 withdrawals for such purpose have been revoked, covering 1,430 acres. There are now 17 rights of way for wagon roads and 1,311 administrative sites withdrawn, embracing 258,807 acres, 161 sites, covering 20,107 acres, being near national forests, and 1,150 sites, covering 238,700 acres, in national forests.

PUBLIC LANDS WITHDRAWN FOR AVIATION PURPOSES.

By Executive order of August 16, 1917, the Salt Plain in Alfalfa County, Okla., containing 20,044 acres, was temporarily withdrawn under the provisions of the act of June 25, 1910 (36 Stat., 847), upon your recommendation, pending determination as to the suitability of the land for an aviation field, the withdrawal being desired by the Secretary of War.

May 2, 1918, a tract of approximately 199,680 acres around Lituya Bay, Alaska, was temporarily withdrawn under the provisions of the said act of June 25, 1910, in order to protect and secure the timber thereon if found suitable and available for use in the construction of aeroplanes for the United States. Such withdrawal was recommended by you at the instance of the Council of National Defense. Report on the joint investigation recently conducted by employees of this office and of the Forest Service, covering the approximate amount of spruce timber having value as aeroplane stock on the tract, its distribution and the facilities for logging, milling, and shipping the timber, with estimates as to the cost thereof, has recently been submitted by you to the Council of National Defense.

POTASH LANDS.

The act of October 2, 1917 (40 Stat., 297), authorizing exploration for and disposition of potassium, provides for issuance by the Secretary of the Interior of permits to prospect for the salts of potassium on public lands in areas of not exceeding 2,560 acres, to be taken in reasonably compact form, and for leases for the production of potassium of lands containing such deposits. Regulations covering permits to prospect were issued under date of December 1, 1917, and general regulations under the act on March 21, 1918. Since these regulations were issued a total of 326 applications for permits to prospect were filed. Final action was taken on 42 of the applications, of which 34 were rejected, and permits were issued on 8 applications. Twelve applications to lease potassium lands have been received, 11 having been filed in the Independence office to lease lands in Searles Lake, Cal., and 1 in the Evanston office for lease of lands in Sweetwater County, Wyo. These applications were filed in May and June, and while awards have been made the leases have not yet been executed.

The Sweetwater County application covers an area of 2,240 acres, with a proposed minimum investment in development and mining operations under the lease of $500,000; and the Searles Lake awards embrace approximately 16,000 acres, the total proposed minimum investment in mining operations under the 11 lease applications aggregating over $3,000,000.

The claims of the California Trona Co., asserted under placer mining locations made prior to the potash leasing act, have been adjusted, and this company has filed relinquishment of all claim to the Searles Lake lands except an area of about 2,560 acres in the former lake bed and about 760 acres of the trona reefs on the northeast side of the lake bed. Subsequent to the settlement of the claims of this company, the public land surveys have been extended over the lake area, and the unclaimed lands therein were offered for lease by legal subdivisions.

The Searles Lake potash deposit, in Inyo and San Bernardino Counties, Cal., is unique in character, occupying the lower or central part of an ancient lake bed, with a saline body of complex structure, from 60 to 80 feet in depth, which permits a free flow of saturate brine, composed of muriate of potash, soda ash, sodium sulphate, common salt, and borax, mixed with water and other compounds not regarded as commercially valuable.

Outside of and surrounding this crystalline body, subject to overflow in the wet season, is a beach a mile or more in width containing so-called trona reefs, heretofore exploited for the soda and borax contained therein.

In my last annual report, attention is called to this valuable deposit, and to the fact that the entire area was held at that time under purported placer locations for whose benefit applications for patent were then pending before the department, but against which proceedings had been directed, charging invalidity of said claims. It will now be noted that prior claims to this deposit have been adjusted and the balance opened under the leasing act.

Under the inchoate titles above mentioned there has already been invested $3,000,000 in a reduction plant, railroad, and other improvements, for the production of potash salts. The American Trona Co. is now producing, and has been for some time, about 2,000 tons of the forty per cent K^2O product per month. On adjoining patented grounds what is known as the Boro-Solvay interests of another plant has been producing about 500 tons. It is hoped that as a result of the 11 leases above referred to, one or more additional plants will be installed for the production of Searles Lake potash, thus inaugurating a great, and at this time, very necessary industry.

CONTESTS IN THE GENERAL LAND OFFICE.

In the administration of the public lands, many cases arise which involve litigation such as can only be properly determined upon testimony taken in accordance with the rules of evidence ordinarily applicable to cases of analogous character in the courts. There are rival claims for the same tract of land; contests are initiated by private persons against entrymen and other claimants, charging illegality or failure to comply with the law, with a view to procuring cancellation of the existing claims and a preference right to enter the lands involved, and the Government also initiates proceedings in the nature of contests on like charges, as the result of investigations by special agents of this office or by officials of the Forest Service where the lands are in national forests.

Complicated situations are often presented as to conflicting settlement and other rights; as to the character of lands as agricultural, arid, swamp or otherwise; as to mistakes in surveys; as to the qualifications of claimants. One class of cases in particular, requiring special care and attention in adjudication, is that involving charges of fraud and conspiracy. To this class belong the so-called "Hyde-Benson" forest lieu selection contests, data regarding which are elsewhere given in this report. In short, such litigation arises in connection with nearly every variety of claims under the public land laws. Many of the cases, besides involving the reading and consideration of voluminous testimony, require the solution of intricate and perplexing questions raised by the ingenuity of litigants and their attorneys by means of objections, motions, and briefs.

The contest division of this office is the special forum provided for the adjudication of these cases. In the year ended June 30, 1918, this division has disposed of 1,151 litigated cases, and in this particular the work is practically up to date.

Not all contests result in hearings, as many entries are canceled under the rules of practice for default of the entrymen in not serving and filing answers to contest charges, and many contests abate or are dismissed for failure of prosecution by the contestants. During the past year 3,368 contests were disposed of in one or the other of these two ways, and the work in this class of cases is now current.

RIGHTS OF WAY.

Contrary to all expectations the year in the right of way section has been heavier than for a number of years past.

In the year just ended, applications for rights of way of all kinds (excepting for hydroelectric power) total 905 as against 624, in 1917. Of these, 101 were applications for railroad rights of way, as against 96 last year, and 804 other than railroad and power, as against 528 in 1917.

We have finally disposed of 167 railroad rights of way, as against 105 during the previous year, and 634 other than railroad and power as against 548 in 1917.

The excellence of this showing is accentuated when it is remembered that each year the difficulty of these examinations is increased.

A reservoir may cover anywhere from 50 or 60 to 1,000 or more acres, and the canals on the same map may involve from 10 to 100 or 200 miles in the aggregate. The tract books which are growing more crowded and difficult to decipher as time passes must be examined as to all lands affected. The number and extent of withdrawals for various purposes is increasing year by year, and where ten years ago conflicts were the exception, now a right of way application without from one to half a dozen conflicts is the exception.

Then, too, the requirements of other bureaus for further showings, profiles, and stipulations are becoming more numerous, and to that extent increasing the work.

Closely allied to the right of way work is what is designated as "forfeiture cases," designed to clear the records of approved rights of way which have not been constructed within the statutory period.

Work upon this class of cases has been energetically pushed despite the lack of help.

During the year just closed 82 new cases were docketed, and 104 disposed of. Eight suits were recommended, wherein the Department of Justice advises suit has been directed, and 10 easements have been declared forfeited and expunged from the records as a result of judicial proceedings heretofore instituted.

Forfeiture.—The act of March 3, 1875 (18 Stat., 482), grants rights of way to railroads over the public lands, upon approval of the application by the Secretary of the Interior—

> *Provided,* That if any section of said road shall not be completed within five years from the location of said section the rights herein granted shall be forfeited as to such uncompleted section of said road.

The act of March 3, 1891 (26 Stat., 1095), grants to any corporation organized for the purpose of irrigation, right of way for reservoirs and canals, upon approval of the application by the Secretary of the Interior, with the same proviso as in the act of March 3, 1875, as to forfeiture if not constructed within five years.

As early as 1904 it became evident that many railroad rights of way had been granted that would not be utilized in the actual construction of a railroad, the department then holding, as it now holds, that under the terms of the act, proceedings in the nature of "office found" were necessary to forfeit such easements, even though the statutory period for the construction of the road has expired, and that in the absence of Congressional action or judicial forfeiture, the department is without jurisdiction to approve a right of way application, over an existing easement where the conflict appeared material. Congress recognized this situation by passing the forfeiture act June 26, 1906 (34 Stat., 482), forfeiting all grants under the act of 1875, where the road had not been constructed within the statutory period, or was not then in the course of construction; and followed that with the forfeiture act of February 25, 1909 (35 Stat., 647), which brought the act of 1906 up to that date, and forfeited all railroad easements, the statutory period for construction of which had expired, excepting such as were proceeding in good faith with construction under their grants. Since that time, nearly 10 years, no other railroad forfeiture act has been enacted.

No forfeiture act of any character has been enacted affecting easements granted under the act of March 3, 1891, although such legislation has been recommended for several successive years.

Under these circumstances it is submitted that some form of forfeiture act is urgently necessary, not only from the standpoint of equity and justice but from an administrative and economic standpoint.

It is suggested that such a forfeiture act might well follow the railroad forfeiture act of 1909, with a proviso investing the Secretary of the Interior with authority to stay the forfeiture for a limited period upon such showing of good faith as he may deem sufficient, and that no easement should become vested until proof of construction has been filed with and approved by the Secretary of the Interior.

STATE IRRIGATION DISTRICTS.

During the past year the act of August 11, 1916 (39 Stat., 506), has taken concrete form, by the adoption of the regulations of March 6, 1918, which are designed to make the legislation effective.

The purpose of the act is to solidify the irrigable area within an irrigation district, to distribute the cost burden equally, and to bring all the lands, both public and private, under unified control by the constituted authority. Thus public and entered but unpatented lands which heretofore have been free from district taxation may be taxed to the same extent and in the same manner as privately owned lands.

In default of the payment of such taxes the possessory right of entrymen may be disposed of at tax sale, the purchaser being subrogated to the rights of the entryman, as though the entry had been assigned, after the lapse of the redemption periods. As to public unentered lands the tax becomes a lien which must be paid by an applicant to enter before his entry will be allowed. The law provides that upon the approval by the Secretary of the Interior of an application by an irrigation district for recognition the right of taxing public and entered but unpatented lands shall accrue to districts which have not yet completed construction. Taxes theretofore actually levied by districts which have completed construction and are in operation become liens upon approval of the application by the Secretary of the Interior.

The regulations of March 6, 1918, are designed to indicate the department's conception of the extent and purpose of the act; the form in which application for recognition should be made; the character and extent of the showing required of the district, to entitle its application to consideration, and the procedure to be followed by the department in the consideration and disposition of such applications.

Thus far no district has been approved under the act, but present indications are that a number of cases will be submitted in the near future.

PRIVATE IRRIGATION PROJECTS.

During the past year 66 new reports and 24 supplemental reports have been received, as the result of investigations of private irrigation enterprises and irrigation districts, upon which desert-land applications or entries depended for their water, making a total of 917 projects or districts reported on since the adoption of the regulations of September 30, 1910 (39 L. D., 253).

During the fiscal year reports on 103 irrigation companies and irrigation districts have been considered and disposed of by this office. In 51 cases, affecting approximately 320 desert-land claims, the conclusions reached were in favor of the recognition of the company or district as a proper source of water supply for the reclamation of desert lands; in 20 cases, affecting about 175 entries, the conclusions were adverse; while 32 cases were closed without any definite conclusion having been reached, it appearing that there were no longer any desert-land entries involved, all having been relinquished or otherwise disposed of. Of the reports thus considered there were six, two favorable and four adverse, which involved projects previously acted upon, and the last action taken was for the purpose of revising or supplementing the previous action.

On July 1, 1918, there were 117 project reports awaiting action, of which 64 were awaiting action elsewhere, mostly in the Geological Survey.

THE COLORADO-WYOMING CASE.

The Colorado-Wyoming case has been reargued in the United States Supreme Court, and it is confidently expected that a decision will be handed down upon the reassembling of the court after recess.

Upon this decision depends to a greater or less extent many individual appropriations of water, appropriations for large irrigation systems, Carey Act enterprises, State irrigation districts, and even United States reclamation projects.

The questions to be decided relate to the ownership and control of the waters of interstate nonnavigable streams by the States through which they flow, and include the following:

(1) Does the water of such a river belong to the State in which it rises as far down as the State boundary, irrespective of prior appropriations below the boundary line, or

(2) Does prior appropriation of the waters govern without limitation or restriction and irrespective of State lines?

The approval of a number of Carey Act lists has been suspended pending the decision of these questions, and upon such decision suspensions will be lifted.

HYDROELECTRIC POWER DEVELOPMENT.

The fact that a "water power bill" has been pending before Congress for the past three or more years, and the general impression that such a bill must ultimately be enacted, has, beyond doubt, militated against a larger power site business, as many prospective applicants are holding up their applications until such law shall be enacted, in the hope that it will be more favorable to them than the laws as they stand.

This office has suspended a needed revision of the right of way circulars pending such legislation because of the probable effect it will have upon such publication, and many entries are held suspended by order of the department pending such enactment.

During the year ending June 30, 1916, permittees paid into the Treasury of the United States $2,918.30, in 1917, $8,407.33, and last year $14,622.55.

This money has been or will be deposited to the credit of the Treasurer of the United States as ''sales of public lands."

In addition to the above, certain other amounts were received in payment under preliminary permits and held as unearned fees until it shall be determined what repayment, if any, should be made to the permittee in accordance with the terms of the preliminary permits.

Several permits have lapsed during the year and others have been declared forfeited on account of the failure of the permittees to comply with some one or more of the conditions expressed in the permits.

CAREY ACT.

The work under the Carey Act has made satisfactory progress during the year, particularly in the way of adjusting several complicated and unfortunate situations that had developed from one cause or another, in closing out withdrawals and segregations for unconstructed projects and restoring the lands to entry, and in bringing about in several instances closer and more effective cooperation with the States.

Areas aggregating 808,145 acres were disposed of, of which 657,078.31 acres were restored to entry, and 11,643.96 acres were patented.

Special effort was made to adjust the Oakley and Salmon River projects in Idaho. Both of these projects are fully constructed; both had sold water rights far in excess of the available water supply; in both settlers had invested their money and years of hard work; both had failed financially and were being carried by the bondholders in an endeavor to procure a partial return for the heavy investment made, and both have been involved in more or less litigation. It will be readily understood that the problem, both from a legal and practical standpoint, of adjusting a project in this condition is not an easy one. Representatives of this office and the governor and State land board of Idaho made a joint investigation and held hearings on each project in order to learn the exact facts of the situation with a view to working out a solution, which it is believed is in a fair way to accomplishment. Repeated experiences such as these convince us more and more each year that too much care and precaution can scarcely be taken in determining the feasibility of new projects.

DESERT LANDS.

During the past year 11,391 desert land cases of all kinds were received for adjudication, divided as follows: Desert applications, 829; applications for reinstatement, 36; original desert-land entries, 2,800; applications for second desert-land entries, 109; annual proofs, 1,810; assignments of desert-land entries, 261; extension of time to make final proof, 1,288; applications to amend, 72; final desert-land entries, 1,941; applications under the act of March 3, 1909, 32; applications for relief, 1,506.

Of the 11,391 cases received, 10,419 were finally disposed of. Two thousand and seventy-eight final desert entries were disposed of as against 1,849 last year. Two thousand and ninety-three were patented, involving 340,281 acres, as against 1,752 in 1917, involving 277,432.33 acres.

TEN CHAIN LOTS.

During the year 32 applications to purchase lots, 10 chains or less in width, in Imperial County, Cal., under the act of March 3, 1909 (35 Stat., 779), were received. One hundred and twenty-one of such applications in all have been patented, involving a purchase price of $16,779.70.

WITHDRAWALS AND RESTORATIONS.

During the past fiscal year 4,765,550 acres of public land were withdrawn from entry, or disposition, under the various acts providing for the withdrawal or reservation of public lands, and 3,434,535 acres theretofore withdrawn have been restored. Some of these withdrawals in part overlap former withdrawals, so that the amount above mentioned as having been withdrawn does not represent with absolute accuracy the amount of enterable land withdrawn. So with respect to restorations. The land restored from a certain withdrawal may be also withdrawn for a different purpose, under another act, in which case the other withdrawal would not be affected, and the lands so covered would not be open to entry or disposition.

These withdrawals and restorations were of the following classes:

Stock driveways.—Under section 10 of the act of December 29, 1916 (39 Stat., 862), 2,079,979 acres have been withdrawn and 79,344 acres released from former withdrawals.

National forests.—During the year 861,460 acres of public land have been added to national forests. One million twenty-seven thousand four hundred and eighteen acres were excluded from such forests, but 77,033 acres thereof were, in the same orders of restoration, withdrawn for other public purposes, under various acts, leaving but 950,385 acres actually restored to entry or disposition. Thirteen thousand one hundred and one acres were released from temporary forest withdrawal.

Coal, petroleum, and phosphate.—Nine thousand three hundred and sixty-nine acres were withdrawn for coal classification, and 867,780 acres previously withdrawn, have been restored; 10,461 acres were withdrawn for petroleum and 248,030 acres for phosphate; 30,034 acres previously withdrawn for phosphate have been restored.

Power site.—In 54 orders, 137,505 acres were withdrawn, under the act of June 25, 1910 (36 Stat., 847), as amended by the act of August 23, 1912 (37 Stat., 497), as valuable in connection with hydroelectric power, and by 12 orders, 2,230 acres theretofore withdrawn were restored.

Public water reserves.—Five withdrawals, under the last abovementioned acts, aggregating 4,128 acres, were made during the past year, and two restorations covering 2,230 acres theretofore withdrawn became effective.

Reclamation.—Under the reclamation act of June 17, 1902 (32 Stat., 388), 676,800 acres were withdrawn and 277,380 acres restored.

Carey Act.—Two thousand five hundred and ninety-six acres were withdrawn under the act of August 18, 1894 (28 Stat., 372–422), and 657,078 acres were restored.

Miscellaneous.—Under the acts of April 23, 1904 (33 Stat., 302); June 25, 1910 (36 Stat., 847–855); August 24, 1912 (37 Stat., 497); March 12, 1914 (38 Stat., 305); May 18, 1916 (39 Stat., 139); and June 9, 1916 (39 Stat., 218), two forest administrative sites, embracing 396 acres, were withdrawn, and 13 such sites, aggregating 1,430 acres, revoked; 450,000 acres of Oregon and California lands theretofore withdrawn were restored; 20,044 acres in Oklahoma were withdrawn for an aviation field; 199,680 acres were withdrawn in Alaska for the supply of airplane timber; 120 acres withdrawn (in aid of the act of June 12, 1917, 40 Stat., 105–145) for well-drilling tests; 77,866 acres were withdrawn in aid of pending legislation to include the same within national forests and to authorize selection thereof in exchange for private property within national forests; April 28, 1917, 19,600 acres in the State of Alabama were withdrawn for a nitrate plant. Through an oversight this amount was not included in the last annual report of withdrawals, and is included this year to correct the error; in aid of the water supply of the city and county of Denver, 1,727 acres were withdrawn; for Indian purposes, 179,160 acres were withdrawn and 12,431 acres (Flathead lands) were restored; for military purposes, 158,240 acres were withdrawn; for various purposes, 1,366 acres withdrawn and 240 acres restored; Siletz timber land, 3,259 acres were restored and offered for sale; for townsite purposes in Alaska, 100 acres withdrawn and 10,980 acres restored; by five Executive orders, six islands or reefs, unsurveyed, and area unknown, were withdrawn for lighthouse purposes.

REPAYMENTS.

The existing laws governing repayments, section 2362, United States Revised Statutes, act of June 16, 1880 (21 Stat., 287), and the act of March 26, 1908 (35 Stat., 48), provide for the return of moneys covered into the Treasury of the United States received in connection with the disposal of the public lands, to be repaid to the entryman, his heirs or assigns, or his legal representatives, in the absence of fraud on their part, in all cases where lands have been erroneously sold; where money has been paid by innocent parties on fraudulent and void soldiers' and sailors' additional homestead entries; where entries were canceled for conflict; where entries are erroneously allowed and can not be confirmed; where applications to make entry, filing, selection, etc., are rejected; and where any amount has been paid in excess of the legal requirement.

Under said laws there were stated during the last fiscal year 1,241 accounts, allowing repayment of $99,370.04, and during said period there were denied 435 claims for repayment. This number of claims allowed and the amount repaid includes 67 accounts allowing repayment of $27,748.65, being moneys received in connection with sale of various Indian reservation lands and repaid from Indian trust funds.

Repayment claims, allowed and denied, by years.

Year.	Claims allowed.	Amount.	Claims denied.
1911	2,338	$178,437.02	712
1912	2,097	178,952.15	619
1913	2,427	217,614.09	644
1914	1,775	123,139.11	482
1915	1,689	305,310.83	799
1916	1,700	218,971.46	940
1917	1,215	106,888.42	434
1918	1,241	99,370.04	435

CIRCULAR INFORMATION.

It has been the custom for years to instruct the local officers and surveyors general and the public by means of circulars treating of the different land laws and regulations thereunder. Formerly it was the practice to endeavor to incorporate all the general agricultural land laws and regulations with respect thereto in a single book. The last of such general circulars was issued on January 25, 1904. It consisted of a book of over 300 pages and was designed to give the public full information relative to procuring title to public lands under all the existing laws. It was a valuable circular, and we find the older clerks citing it to-day. In fact there are a number of copies around the office that are constantly referred to, and we do not doubt but what this is the case in many of the local offices. The single general circular idea had its objections, however. In the first place, the ordinary inquiry was more or less specific. The inquirer wanted to know something about the mining laws or the homestead laws, or the coal land laws, as the case might be, and as a rule was interested in but the one subject. Nevertheless, the office must pay the expense of printing, and the mails must carry this 300-page book to give the inquirer the information he wanted which he would perhaps find on a single page. Also, new land legislation came along so rapidly and there were so many modifications of laws and regulations that to keep it up to date frequent new editions would be necessary. This, of course, was impracticable, and consequently numerous supplemental circulars had to be issued, until shortly, to run down a subject completely, one needed not only the general circular, but one or more supplemental circulars, all of which led to confusion.

In the course of time this experience led to the necessity of printing numerous small circulars on each separate subject, which could be more readily brought up to date whenever changes were necessary and by means of which the specific information could be given to inquirers on the subjects in which they were interested, at the least possible cost. There are objections in some instances to this practice. At the present time if one desires to make a complete study of the existing general land laws, practice, and regulations he needs a collection of about 300 circulars. Because of the large number of circulars and to facilitate the furnishing of information to those desiring same, in 1916 there was published a "Circular of circulars," which gave a complete list of the subjects and numbers of all the circulars now in force. This circular included a considerable list of circulars now out of print and only available in the Land Decisions. For the local offices, of course, the Land Decisions furnish by far the most reliable and connected reference library of circulars, for all circulars approved by the Secretary are printed in the Land Decisions.

In the case, however, of the new Alaska circular of July 19, 1916, to a certain extent, the old practice was followed and a single circular issued covering all the land laws having special reference to the Territory. This was deemed to be advisable by reason of our experience with respect to inquiries about Alaska. In the building of the Alaska railroad, the enactment of the Alaska coal land laws and other legislation designed to "open up Alaska," there was a marked revival of interest in the Territory. As a rule those going to Alaska wanted to know all about all the laws especially applicable to that region, consequently the Alaska circular of 87 pages was published, and our experience with it since has amply justified the wisdom of placing all the information relative to the Alaska land laws in a single book.

Of the current circulars, the one most in demand and of which we are required to print the largest editions is "Suggestions to homesteaders." It is printed in editions of 50,000 to 75,000 copies, and the average annual demand runs around 125,000 copies, notwithstanding that care is used in its distribution, and as a rule it is sent out only in response to specific inquiries and not in bunches to be distributed by somebody else. When the grazing homestead act was passed a supplemental circular with regard to it was of course necessary immediately. The first edition was 100,000, and immediately thereafter another 100,000 copies of this circular, and there has been used so far about 210,000 copies. Of the new mining circular of August 6, 1915, consisting of about 100 pages, an edition of 5,000 copies was printed, of which only about 1,300 are left. While the demand for the mining circular is not as large as for some others, it is a demand that is constant, not a day passing without one to a dozen requests for copies. Of the new coal land circular of July 7, 1917, 25,000 copies were printed, and of no circular referring to legislation of general application do we print less than 5,000. One hundred and fifteen thousand copies of the vacant public land circular were used last year; about 80,000 of the little circular on military service of homesteaders are used in a year. Of all classes, the office distributes, either direct or through the local offices, about 625,000 circulars a year, exclusive of circulars giving information with respect to the opening of Indian lands, besides answering an average of 100 letters a day in response to general inquiries not connected with any particular case pending in the office.

One more or less objectionable feature of the separate circular system is the necessity of making frequent reference from one circular to another. This practice has gone so far that not infrequently we find ourselves sending half a dozen circulars to the same person to the end that he may get all the information he wants on a single general subject. A fair illustration of this is the current "Suggestions to homesteaders," which no longer covers all of the circular information available on the homestead law but makes frequent reference to other special instructions. This has led to consideration of the advisability of printing a single circular covering everything with respect to the homestead laws; in fact, copy for such circular has been assembled. It will make a book of about 140 pages and will take the place of "Suggestions," the circular under the three-year homestead law, circular under the grazing act, circular under the enlarged homestead law, and fifteen or twenty others bearing on some aspect of the general subject of homesteads. The thought has been that one desiring to know about the homestead laws will be likely to want to know all about them and that it would be advisable to place all of this information in a single book. The fact remains, however, that we are answering many inquiries with small circulars of a few pages, and that if we do not continue the editions of these small special circulars, we will be sending out a book of 140 pages in reply to every inquiry about the homestead laws, and if Congress takes occasion to enact considerable new legislation in the near future, our 140-page book will soon be more or less behind the times.

NATURALIZATION LAWS AMENDED.

The act of May 9, 1918 (Public No. 144, 65th Cong.) besides making provisions for the early naturalization of aliens in the military and naval service of the United States during the present war, by preliminary examination before a representative of the Bureau of Naturalization, instead of appearing before the clerks of courts at their offices, also repeals section 2171 of the United States Revised Statutes prohibiting alien enemies from becoming naturalized during the period of war and allows an alien to be admitted to become a citizen of the United States in cases where he made his declaration of intention not less than two nor more than seven years prior to the existence of the state of war, or was at that time entitled to become a citizen of the United States without making a declaration of intention, or if his petition for naturalization shall then be pending and is otherwise entitled to admission; but before his petition is called for hearing or heard 90 days' notice must be given the Bureau of Naturalization, who may, upon objection, have indefinite postponements. Provision is also made that the President may, in his discretion, upon investigation and report by the Department of Justice, fully establishing the loyalty of an alien enemy not included in the above exemption, except such alien enemy from the classification of alien enemy, and thereupon he shall have the privilege of applying for naturalization.

In view of these remedial provisions, it will not now be necessary for final proofs submitted by alien enemies to remain suspended during the entire period of the present war, but only until such entrymen have become naturalized under this act, if advantage is taken thereof by them and they are granted such relief.

Relief is also provided under this act for those aliens (not enemies) who have resided uninterruptedly within the United States during the period of five years next preceding July 1, 1914, and were on that date otherwise qualified to become citizens of the United States, but had not made the declaration of intention required by law, and who during or prior to that time, because of misinformation regarding their citizenship status, erroneously exercised the rights and performed the duties of citizens of the United States in good faith; such persons may now be admitted as citizens of the United States without making the preliminary declaration of intention, by filing a petition for naturalization and satisfying the court that they have so acted, and complied with the other requirements of the naturalization laws in all respects. This provision may give relief to that class of public land claimants who have found it difficult to establish their citizenship by affidavits of voting and otherwise exercising the privileges of citizenship under misinformation or ignorance of the law.

This act also repeals the expatriation act of October 5, 1917, providing:

> That any person who, while a citizen of the United States and during the existing war in Europe, entered the military or naval service of any country at war with a country with which the United States is now at war, who shall have been deemed to have lost his citizenship by reason of any oath or obligation taken by him for the purpose of entering such service, may resume his citizenship by taking the oath of allegiance to the United States prescribed by the naturalization law and regulations, and such oath may be taken before any court of the United States or of any State authorized by law to naturalize aliens, or before any consul of the United States, and certified copies thereof shall be sent by such court or consul to the Department of State and the Bureau of Naturalization, and the act (Public 55, 65th Cong., approved Oct. 5, 1917) is hereby repealed."

The repealed act limited the relief to those who took the oath of allegiance to an allied country since August 1, 1914, and contained other features not relevant to public land matters. The main features as to resuming citizenship in the United States by taking the proper oath of allegiance to the United States before any court of the United States or of any State authorized by law to naturalize aliens, or before any consul of the United States and the securing of certified copies thereof through the Department of State and Bureau of Naturalization are provided for. A number of public land claimants who enlisted in the military or naval service of our allies before the United States declared war against Germany may seek the relief granted.

WAR RELIEF LEGISLATION.

In its consideration of legislation necessary for the successful prosecution of the war with Germany, Congress has not overlooked the needs of those public land claimants who have become engaged in the military or naval service of their country. In my report of last year attention was directed to the act of July 28, 1917 (40 Stat., 248), for the relief of homestead settlers, applicants and entrymen; public resolution No. 10, approved July 17, 1917 (40 Stat., 243), to relieve the owners of mining claims from performing assessment work; and the act of August 7, 1917 (40 Stat., 250), for the protection of desert land claimants. Additional legislation of a similar character has been enacted as follows:

By section 11, of the act of August 10, 1917 (40 Stat., 273), the Secretary of the Interior is authorized, in his discretion, to suspend, during the period of emergency resulting from the existing war, that provision of the reclamation act requiring residence on or in the neighborhood of privately owned lands by one securing water from a reclamation project for the irrigation of such lands. This legislation has been carried into effect by the regulations approved October 4, 1917 (46 L. D., 213).

With a view to the conservation of labor and its employment in work more vitally connected with the prosecution of the war, public resolution No. 12, approved October 5, 1917 (40 Stat., 343), was enacted. Its effect is to relieve mining claimants, without regard to military or naval service, from performing annual assessment work, as required by section 2324, United States Revised Statutes, during the years 1917 and 1918, provided the claimant seeking the benefit of said law should file a notice to that effect in the office where his location notice was recorded, the same to be filed on or before December 31 of each of the years named. This law does not apply to oil placer locations or claims, and does not amend or repeal public resolution No. 10 (40 Stat., 243), supra, for the relief of mining claimants in the military or naval service of the United States. No regulations have been issued, as the matters involved are within the jurisdiction of the courts and not the Land Department.

The act of October 6, 1917 (40 Stat., 391), provides that during the continuance of the present war with Germany, and until his discharge from service, any man serving in the armed forces of the United States who, prior to the beginning of his service was a settler, applicant, or entryman under the land laws, or who, under the same condition, had filed contest against a claim with the view to exercising preference right of entry, may make any affidavit required by law or regulation in connection with such application, entry, or contest, or the exercise of his preference right in the event such contest terminates successfully, before the officer commanding in the branch of the service in which the party is engaged, and such affidavit shall be as binding in law as though executed before the register of the proper United States land office. Regulations under this act are contained in circular No. 573, approved November 19, 1917 (46 L. D., 232).

The act of December 20, 1917 (Public No. 94), provided that any homestead settler or entryman, whose settlement was initiated or application for entry filed prior to the date of the act, may have leave of absence for the purpose of engaging in farm labor, and the time he is so absent from his homestead claim, while actually engaged in farm labor, shall be counted as residence upon the homestead. The settler must notify the proper district land office within 15 days after leaving his claim, and at the expiration of each calendar year file in said office a written statement, under oath, and corroborated by two witnesses, giving the dates covering all such periods of absence during the preceding year, and where and for whom he was engaged in farm labor during such absences. Said act, which continues effective during the period of the war, does not excuse the settler or entryman from making such improvements on the homestead or performing the cultivation which the homestead law requires. Regulations thereunder are found in circular No. 581, approved January 10, 1918 (46 L. D., 276).

The act of March 8, 1918 (Public No. 103), is known as the "Soldiers' and sailors' civil relief act," and affords general protection to the civil rights of persons in military service. Section 501 is particularly applicable to rights under the public land laws, and with respect to such rights initiated or acquired prior to entering the military or naval service its effect is to afford complete protection against any forfeiture or prejudice by reason of absence from the land, failure to perform any work or make any improvements thereon, or do any other act required by law or regulation applicable to the claim during the period of service. This statute does not take away any of the benefits conferred by the other relief legislation mentioned; it does not limit or affect the right of a person in the military or naval service to take any action that may be authorized by law or regulation for the perfection, defense, or further assertion of rights initiated prior to entering the service, and in aid of the assertion of such rights authorizes the making of any affidavit or proof in connection therewith before the officer in immediate command and holding a commission in the branch of the service in which the party is engaged. In order to assure protection under this act, it is only necessary that the party entitled to its benefits, or some one in his behalf, notify this office, or the proper district land office, of the facts concerning his service, together with a description sufficient to identify his claim. Said section 501 is printed and explained in circular No. 600, approved May 16, 1918.

AVAILABLE AGRICULTURAL LANDS.

Our last public-land circular informed the public that on July 1, 1917, there were, exclusive of Alaska, over 225,000,000 acres of remaining unappropriated and unreserved public lands, all of which is true, yet this same public-land circular seems to have led to many erroneous notions as to what these public lands consist of. Many people seem to believe that great areas of these lands are virgin prairie grass lands like Kansas, Nebraska, or the Dakotas, all ready for the plow and the immediate production of wheat for our allies and ourselves, or, if situated in the arid regions, that water is readily available for reclamation. The fact is that with some exceptions hereinafter referred to, the great bulk of this 225,000,000 acres is essentially a grazing proposition. Speaking generally, the crop lands are gone into private ownership. Increased land values and the constant demand for more lands, coupled with liberal laws, have resulted in the absorption of practically the entire remaining farm lands suitable for crop production. Of course there are exceptions to this. This is a big country; not infrequently we have been restoring limited areas of ceded Indian lands or areas that have been withheld from entry in aid of irrigation projects or something of that sort which are quite desirable. But the general situation is what must be kept in mind. During recent years we have patented from 10,000,000 to 14,000,000 acres a year. As long ago as 1909 Congress recognized that the "dry farming" period had come, and provided for 320-acre homestead entries; most of the homestead business since that time has been under that act. It has accomplished wonders in some sections. Great areas in Montana, Wyoming, Colorado, and Idaho, which only a few years ago were open cattle range, now support prosperous farming communities. They are producing much grain and as a rule more meat than when these sections were open cattle range. This activity has resulted in the taking up of practically all the good crop lands. Congress recognized this when it passed the grazing homestead act allowing 640-acre entries of grazing lands, and the homestead business from now on will be about nine-tenths grazing homesteads.

Under the enlarged homestead (320-acre) act, a reduction of area of cultivation is allowable under certain rules and regulations where cultivation is impracticable; the law requires the cultivation of only one-eighth of the area, yet hundreds of such applications have been allowed after careful examination of the lands by special agents so that there could be no question as to the facts. Would these men and women undergo the necessary hardships to secure a home on lands so rough, mountainous, or arid that cultivation of an eighth is impossible or impracticable if there were plenty of level, fertile farm lands available? The question answers itself. The point we desire to make clear, and which the public should understand, is that, generally speaking, the remaining public lands are not farm lands in the ordinary sense of crop production at all. This does not mean that these lands are not useful, for they support a great portion of the meat and wool production of the country and are carrying their full capacity of cattle and sheep. There are large areas of privately owned dry farm lands and considerable areas of irrigable lands in the western States that are not being cultivated up to the limit. In the southern States there are millions of acres of lands not now producing anything like what they could be made to produce at a profit. Nevada has more public lands than any other State, yet we venture the statement that one can find more waste land, land not being put to its best use, within 50 miles of Washington than could be found in the whole State of Nevada.

To guard against any misunderstanding from the above, it should be stated that between the Sierras and the Pacific a somewhat different situation exists; here there is opportunity for a largely increased area of farm lands, some of it on public lands, and that to a large extent without irrigation, though the bringing of these lands into cultivation not infrequently involves the clearing of cut-over timber lands. It should also be stated that there are now under Government irrigation projects in the western States over 500,000 acres for which water is now available from constructed works, but which lands are not under cultivation. A large portion of this area is doubtless capable of intensive crop production almost immediately. Data recently compiled by this office indicates that there are doubtless not less than 2,000,000 acres of private and public lands under private or municipal irrigation projects for which water is now available that are not in cultivation, or if so, not to the fullest extent. While irrigated lands with water rights can usually be procured on comparatively easy terms, it should be understood that it is next to impossible for a settler on such lands to succeed without some little capital. By reason of the time, labor, and expenditure required, new irrigation projects to produce food for the war are impracticable, but it is entirely practical to devise ways and means to bring into immediate cultivation and production a considerable portion of land for which water is now available from constructed projects.

THE LAND SERVICE BULLETIN.

In my last annual report attention was called to the Land Service Bulletin, a monthly publication established March 1, 1917, in the General Land Office, devoted to the interest of the land service.

Primarily it was intended to serve as a medium of direct communication between the different branches of the land service, both in the field and office work, so that uniformity of action in the administration of public-land laws might be assured through a thorough dissemination of the principles involved in the statutes, decisions, and regulations.

The value of the Bulletin in our public-land activities has proved much greater than could have been foreseen even by those best acquainted with the necessities of the service, and the field of its usefulness grows wider with every issue. It not only affords a means for the prompt publication of new legislation, announcement of important regulations, changes in procedure, and special instructions that affect the service generally, but also the opportunity of securing practically a personal conference between the officials of the Land Department affected and interested in these matters. Through the Bulletin district land officers, surveyors general, chiefs of field divisions, field officers of the surveying force, as well as the officials at headquarters, may present and discuss all difficulties attendant upon the enforcement of existing statutes or regulations with a view to amendatory legislation or executive relief. A more thorough community of interest is thus brought about within the land service, a result which, in itself, justifies the continuance of the publication if no better reason existed.

But, aside from this view, it will be seen that the Bulletin has a function to perform peculiar to itself so fundamentally important in the administration of the public-land laws that its establishment on a permanent foundation is now recognized essential to the effective maintenance of the service.

The first 12 numbers of the Bulletin (Vol. 1) have been called in from the field, and after a table of contents and index have been supplied will be returned for the permanent files of the field offices. In this way a valuable compilation of current land laws, instructions, and decisions, will be put within the reach of our officers as well as the public.

The publication at the present time is printed by mimeographic process and is limited to an issue of 375 copies; but I am satisfied from my experience that it should be given a more effective recognition as an essential equipment of the land service, and therefore renew my recommendation that in our estimates for printing in the ensuing year due provision be made for this publication.

PROPOSED LEGISLATION.

For the reasons set forth herein, I am suggesting new legislation as follows:

1. Fixing a period beyond which selections under the swamp-land grant will not be received.

2. Authorizing issue of patent, with mineral reservation, to purchaser in good faith from the State of designated school sections subsequently found to have been excepted from the grant to the State on account of the mineral therein.

3. Forfeiting rights of way for failure to construct within the statutory period.

4. Repeal of the provisions of law, applicable to Alaska, creating reserved shore spaces between entries along navigable waters, and limiting the water frontage of such entries.

5. Authorizing State transferees, under the swamp-land grant, to purchase, under certain conditions, the land from the United States where the State sold without title.

CONCLUSION.

I regret to state that the condition of the work at the end of the fiscal year, in the Washington office, is not as nearly current as it should be; the field service branch is also in arrears, though despite the handicap of loss of employees, the work in this branch is in a little better shape than a year ago. Generally speaking, the work in local offices, in offices of Surveyors General, and in the field surveying organization, is still in a satisfactory condition, though the present indications are that there is bound to be a falling off in the output of the last named next year. The principal cause contributing to the arrears mentioned is inability to procure or retain experienced employees, as a direct or indirect result of war conditions. The total number of regular employees of this office is about 1,500, a little over one-third of whom are in the Washington office. During the year there were more than 550 separations from this service, of which about 250 were temporary employees. There were 565 new appointments during the year of which 337 were temporary. The excessive number of temporary employees indicates the difficulty we are confronted with; nobody without experience can handle any except the simplest work of this office efficiently. To a large extent those who have left, particularly for war service, have been our younger and more efficient employees. Anticipating this situation, recommendation was made in the estimates for—(*a*) a comprehensive revision of salaries upward, and (*b*), additional clerks for the Washington office; only the latter was granted. We still have on our statutory roll 26 clerks at $720, 65 at $900, and 77 at $1,000. Except for file clerks and others without experience, the first two classes avail us little, and the third not much, even with the $120 flat increase allowed by Congress; the additional clerks allowed less than offset the loss resulting from our inability to get commensurate benefit from the low salaried clerks that we are authorized to employ. Something over 350 of our employees will be required to register in the new draft, which will further deplete our forces. Under the circumstances, therefore, we must simply do the best we can with such forces as may be available.

CLAY TALLMAN,
Commissioner.

The SECRETARY OF THE INTERIOR.

STATISTICS RELATING TO THE DISPOSITION OF THE PUBLIC DOMAIN.

Area of States and Territories.

[Based upon careful joint calculations made in the General Land Office, the Geological Survey, and the Bureau of the Census.]

State or Territory.	Land surface.		Water surface.		Total areas.	
	Sq. m.	*Acres.*	*Sq. m.*	*Acres.*	*Sq. m.*	*Acres.*
Alabama	51,279	32,818,560	719	460,160	51,998	33,278,720
Arizona	113,810	72,838,400	146	93,440	113,956	72,931,840
Arkansas	52,525	33,616,000	810	518,400	53,335	34,134,400
California	155,652	99,617,280	2,645	1,692,800	158,297	101,310,080
Colorado	103,658	66,341,120	290	185,600	103,948	66,526,720
Connecticut	4,820	3,084,800	145	92,800	4,965	3,177,600
Delaware	1,965	1,257,600	405	259,200	2,370	1,516,800
District of Columbia	60	38,400	410	6,400	70	44,800
Florida	54,861	35,111,040	3,805	2,435,200	58,666	37,546,240
Georgia	58,725	37,584,000	540	345,600	59,265	37,929,600
Idaho	83,354	53,346,560	534	341,760	83,888	53,688,320
Illinois	56,043	35,867,520	622	398,080	56,665	36,265,600
Indiana	36,045	23,068,800	309	197,760	36,354	23,266,560
Iowa	55,586	35,575,040	561	359,040	56,147	35,934,080
Kansas	81,774	52,335,360	384	245,760	82,158	52,581,120
Kentucky	40,181	25,715,840	417	266,880	40,598	25,982,720
Louisiana	45,409	29,061,760	3,097	1,982,080	48,506	31,043,840
Maine	29,895	19,132,800	3,145	2,012,800	33,040	21,145,600
Maryland	9,941	6,362,240	2,386	1,527,040	12,327	7,889,280
Massachusetts	8,039	5,144,960	227	145,280	8,266	5,290,240
Michigan	57,480	36,787,200	500	320,000	57,980	37,107,200
Minnesota	80,858	51,749,120	3,824	2,447,360	84,682	54,196,480
Mississippi	46,362	29,671,680	503	321,920	46,865	29,993,600
Missouri	68,727	43,985,280	693	443,520	69,420	44,428,800
Montana	146,201	93,568,640	796	509,440	146,997	94,078,080
Nebraska	76,808	49,157,120	712	455,680	77,520	49,612,800
Nevada	109,821	70,285,440	869	556,160	110,690	70,841,600
New Hampshire	9,031	5,779,840	310	198,400	9,341	5,978,240
New Jersey	7,514	4,808,960	710	454,400	8,224	5,263,360
New Mexico	122,503	78,401,920	131	83,840	122,634	78,485,760
New York	47,654	30,498,560	1,550	992,000	49,204	31,490,560
North Carolina	48,740	31,193,600	3,686	2,359,040	52,426	33,552,640
North Dakota	70,183	44,917,120	654	418,560	70,837	45,335,680
Ohio	40,740	26,073,600	300	192,000	41,040	26,265,600
Oklahoma	69,414	44,424,960	643	411,520	70,057	44,836,480
Oregon	95,607	61,188,480	1,092	698,880	96,699	61,887,360
Pennsylvania	44,832	28,692,480	294	188,160	45,126	28,880,640
Rhode Island	1,067	682,880	181	115,840	1,248	798,720
South Carolina	30,495	19,516,800	494	316,160	30,989	19,832,960
South Dakota	76,868	49,195,520	747	478,080	77,615	49,673,600
Tennessee	41,687	26,679,680	335	214,400	42,022	26,894,080
Texas	262,398	167,934,720	3,498	2,238,720	265,896	170,173,440
Utah	82,184	52,597,760	2,806	1,795,840	84,990	54,393,600
Vermont	9,124	5,839,360	440	281,600	9,564	6,120,960
Virginia	40,262	25,767,680	2,365	1,513,600	42,627	27,281,280
Washington	66,836	42,775,040	2,291	1,466,240	69,127	44,241,280
West Virginia	24,022	15,374,080	148	94,720	24,170	15,468,800
Wisconsin	55,256	35,363,840	810	518,400	56,066	35,882,240
Wyoming	97,594	62,460,160	320	204,800	97,914	62,664,960
	2,973,890	1,903,289,600	52,899	33,855,360	3,026,789	1,937,144,960
Alaska					590,884	378,165,760
Guam					210	134,400
Hawaii					6,449	4,127,360
Canal Zone					436	279,040
Philippine Islands					115,026	73,616,640
Porto Rico					3,435	2,198,400
American Samoa					77	49,280
Virgin Islands					138	88,320
Total					3,743,444	2,395,804,160

Owing to their location adjoining the Great Lakes, the States enumerated below contain approximately an additional number of square miles as follows: Illinois, 1,674 square miles of Lake Michigan; Indiana, 230 square miles of Lake Michigan; Michigan, 16,653 square miles of Lake Superior, 12,922 square miles of Lake Michigan, 9,925 square miles of Lake Huron, and 460 square miles of Lakes St. Clair and Erie; Minnesota, 2,514 square miles of Lake Superior; New York, 3,140 square miles of Lakes Ontario and Erie; Ohio, 3,443 square miles of Lake Erie; Pennsylvania, 891 square miles of Lake Erie; Wisconsin, 2,378 square miles of Lake Superior and 7,500 square miles of Lake Michigan.

In addition to the water areas noted above, California claims jurisdiction over all Pacific waters lying within 3 English miles of her coast; Oregon claims jurisdiction over a similar strip of the Pacific Ocean 1 marine league in width between latitude 42° north and the mouth of the Columbia River, and Texas claims jurisdiction over a strip of Gulf water 3 leagues in width adjacent to her coast and between the Rio Grande and the Sabine Rivers.

United States district land offices, 98.

Locations.	Established.	Opened.
Alabama:		
Montgomery	July 10, 1832	Jan. 1, 1834
Alaska:		
Fairbanks	May 14, 1907	July 1, 1907
Juneau	Apr. 2, 1902	June 20, 1902
Nome	May 14, 1907	July 1, 1907
Arizona:		
Phoenix	July 25, 1905	Oct. 2, 1905
Arkansas:		
Camden	Jan. 10, 1871	Mar. 20, 1871
Harrison	July 14, 1870	Feb. 27, 1871
Little Rock	Feb. 17, 1818	Sept. 1, 1821
California:		
El Centro	June 15, 1916	Sept. 1, 1916
Eureka	Mar. 29, 1858	July 24, 1858
Independence	Apr. 22, 1886	Mar. 22, 1887
Los Angeles	June 12, 1869	Sept. 22, 1869
Sacramento[1]	July 26, 1866	Nov. 12, 1867
San Francisco	Mar. 4, 1911	May 1, 1911
Susanville	Feb. 10, 1871	Mar. 2, 1871
Visalia	Mar. 29, 1858	July 10, 1858
Colorado:		
Del Norte	June 20, 1874	Mar. 22, 1875
Denver	June 4, 1864	Aug. 15, 1864
Durango	Apr. 20, 1882	Oct. 2, 1882
Glenwood Springs	July 3, 1884	Nov. 10, 1884
Hugo	Feb. 6, 1890	Sept. 7, 1890
Lamar	Aug. 4, 1886	Jan. 3, 1887
Leadville	Apr. 5, 1879	July 1, 1879
Montrose	Jan. 4, 1888	Sept. 1, 1888
Pueblo	May 27, 1870	Jan. 16, 1871
Sterling	Feb. 6, 1890	Aug. 1, 1890
Florida:		
Gainesville	June 8, 1872	Apr. 30, 1873
Idaho:		
Blackfoot	Sept. 3, 1886	Nov. 16, 1886
Boise	July 26, 1866	Jan. 13, 1868
Coeur d'Alene	July 14, 1884	Dec. 21, 1885
Hailey	Jan. 24, 1883	July 16, 1883
Lewiston	July 26, 1866	Sept. 26, 1871
Kansas:		
Dodge City	Dec. 20, 1893	Feb. 3, 1894
Topeka	July 24, 1861	Sept. 10, 1861
Louisiana:		
Baton Rouge	Jan. 6, 1911	Apr. 1, 1911
Michigan:		
Marquette	Mar. 19, 1857	July 14, 1857
Minnesota:		
Cass Lake	Apr. 1, 1903	July 1, 1903
Crookston	Apr. 29, 1878	May 5, 1879
Duluth	Mar. 27, 1862	Jan. 15, 1863
Mississippi:		
Jackson	June 23, 1836	July 25, 1836
Missouri:		
Springfield	June 26, 1834	Oct. 4, 1838
Montana:		
Billings	Feb. 5, 1906	July 2, 1906
Bozeman	June 20, 1874	Oct. 5, 1874
Glasgow	Feb. 25, 1907	June 1, 1907
Great Falls	May 8, 1902	Aug. 1, 1902
Havre	Mar. 15, 1910	July 1, 1910
Helena	Mar. 2, 1867	Apr. 27, 1867
Montana—Contd.		
Kalispell	Mar. 2, 1897	July 1, 1897
Lewistown	Apr. 1, 1890	Nov. 26, 1890
Miles City	Apr. 30, 1880	Oct. 19, 1880
Missoula	Apr. 1, 1890	Apr. 20, 1891
Nebraska:		
Alliance	Apr. 16, 1890	July 1, 1890
Broken Bow	do	July 7, 1890
Lincoln	July 7, 1868	Sept. 7, 1868
North Platte	Apr. 22, 1872	Apr. 11, 1873
O'Neill	Apr. 7, 1888	July 16, 1888
Valentine	June 19, 1882	July 7, 1883
Nevada:		
Carson City	July 2, 1862	Mar. 1, 1864
Elko	Oct. 3, 1913	Jan. 1, 1914
New Mexico:		
Clayton	Dec. 18, 1888	Aug. 12, 1889
Fort Sumner	June 22, 1910	Oct. 1, 1910
Las Cruces	Mar. 10, 1883	May 1, 1883
Roswell	Mar. 1, 1889	Dec. 9, 1889
Santa Fe	May 24, 1858	Nov. 24, 1858
Tucumcari	Mar. 16, 1908	July 1, 1908
North Dakota:		
Bismarck	Apr. 24, 1874	Oct. 12, 1874
Dickinson	Mar. 16, 1904	July 1, 1904
Minot	Sept. 26, 1890	Oct. 1, 1891
Williston	Apr. 26, 1906	Aug. 1, 1906
Oklahoma:		
Guthrie	Mar. 3, 1889	Apr. 22, 1889
Oregon:		
Burns	June 1, 1889	Sept. 2, 1889
La Grande	July 3, 1866	Nov. 15, 1867
Lakeview	June 6, 1877	Aug. 6, 1877
Portland	Aug. 24, 1854	Jan. 1, 1855
Roseburg	Sept. 15, 1859	Jan. 3, 1860
The Dalles	Jan. 11, 1875	June 1, 1875
Vale	Mar. 15, 1910	July 1, 1910
South Dakota:		
Bellefourche	Feb. 6, 1909	July 1, 1909
Gregory	July 14, 1880	Jan. 3, 1882
Lemmon	May 29, 1908	Aug. 1, 1908
Pierre	Feb. 10, 1890	May 12, 1890
Rapid City	Dec. 13, 1888	Jan. 15, 1889
Timber Lake	Feb. 12, 1911	May 1, 1911
Utah:		
Salt Lake City	July 16, 1868	Nov. 1, 1868
Vernal	May 9, 1905	July 1, 1905
Washington:		
Seattle	June 27, 1887	Dec. 3, 1887
Spokane	June 23, 1883	Oct. 1, 1883
Vancouver	May 16, 1860	July 3, 1861
Walla Walla	Mar. 3, 1871	July 17, 1871
Waterville	May 16, 1890	Nov. 6, 1890
Yakima[2]	Apr. 11, 1885	Apr. 24, 1885
Wisconsin:		
Wausau	June 19, 1872	Aug. 19, 1872
Wyoming:		
Buffalo	Mar. 3, 1887	May 1, 1888
Cheyenne	Feb. 5, 1870	Aug. 10, 1870
Douglas	Apr. 23, 1890	Nov. 1, 1890
Evanston	Aug. 9, 1876	Aug. 13, 1877
Lander	Apr. 23, 1890	Nov. 8, 1890
Sundance	Apr. 3, 1890	Oct. 27, 1890

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[1] Office originally established January 16, 1857, and transferred to Oakland, California, following the fire on Apr. 16, 1906.

[2] Name changed Jan. 1, 1918.

NOTE.—The land offices in Ohio; Indiana, Illinois, and Iowa are abolished, and the vacant tracts of public lands in those States are subject to entry and location at the General Land Office, Washington, D. C

List of offices of United States surveyors general.

Locations.	Established.	Locations.	Established.
Alaska: Juneau	May 17, 1884	New Mexico: Santa Fe	Mar. 2, [illegible]
Arizona: Phoenix	Feb. 24, 1863	Oregon: Portland	July 17, [illegible]
California: San Francisco	Mar. 3, 1851	South Dakota: Huron	Apr. 10, [illegible]
Colorado: Denver	Feb. 28, 1861	Utah: Salt Lake City	July 16, [illegible]
Idaho: Boise	June 29, 1866	Washington: Olympia	July 17, [illegible]
Montana: Helena	July 2, 1864	Wyoming: Cheyenne	Feb. 5, [illegible]
Nevada: Reno	July 4, 1866		

Field division headquarters of special agents of General Land Office.

Field division:	
Portland	Portland, Oreg.
San Francisco	San Francisco, Cal.
Alaskan	Juneau, Alaska.
Helena	Helena, Mont.
Denver	Denver, Colo.
Cheyenne	Cheyenne, Wyo.
Southern	Jackson, Miss.
Salt Lake City	Salt Lake City, Utah.
Santa Fe	Santa Fe, N. Mex.

Present organization General Land Office.

A. Administrative duties. Appointments; bonds of officials, except mineral surveyors; correspondence concerning local officers, surveyors general, etc.; establishment of new land districts, changes in location of district land offices, changes in district boundary lines, discontinuance of local land offices; publication of notices of intention to offer final proof; opening and sale of Indian reservations; printing and binding; bird reservations; national monuments; leaves of absences; requisitions for supplies; record of attorneys and agents admitted before department and its bureaus, also before district land offices.

B. Record of patents; use of rectigraph and photostat machines in making photographic copies of papers.

C. Homesteads, all original, except reclamation; final homesteads; commuted homesteads; homestead declaratory statements; timber and stone entries; public sales, isolated tracts; private sale, lands in Missouri.

D. Mails and files.

E. Surveys.

F. Reclamation work, excepting Minnesota drainage; rights of way; power sites; withdrawals and restorations under the act of June 25, 1910; desert land entries; easements and permits.

G. Land grants to States and corporations.

H. Contests.

K. Indian allotments and Indian homesteads; opening and sale of Indian reservations; preemptions; townsites; military bounty land warrants; abandoned military reservations; agricultural college and other similar scrip; lieu selections; Indian exchange selections; graduation and credit system entries; private land claims; Minnesota drainage entries; Chippewa logging, Minnesota.

L. Drafting; compilation, engraving, and supervision of publication of United States map for Congress, compilation and revision of State maps, diagrams and miscellaneous maps; custodian of original plats, field notes, and photolithographic copies of township plats.

M. Accounts; repayments; statistics.

N. Mineral entries; contests involving character of land; protests in mineral cases; coal, oil, phosphate, and potash withdrawals and restorations; Northern Pacific classification; mineral segregation plats; bonds of mineral surveyors.

O. Posting, tract books.

FS. Soldiers' additional homesteads; fraudulent entries; timber trespass; unlawful inclosure public domain; suits to set aside patents; disbarment of attorneys and agents; forest reserve eliminations, restorations, etc.

Average number of employees of the General Land Office, June 30, 1918.

In General Land Office, Washington, D. C	504
In 13 offices of surveyors general	138
In 98 district land offices	253
In the field service	139
In the surveying service	122
In logging service	3
Custodians	1
Total	1,160

Final homestead entries from passage of homestead act to June 30, 1918.

Fiscal year ended June 30—	Number.	Acres.
1868	2,772	355,086.04
1869	3,965	504,301.97
1870	4,041	519,727.84
1871	5,087	629,162.25
1872	5,917	707,409.83
1873	10,311	1,224,890.93
1874	14,129	1,585,781.56
1875	18,293	2,068,537.74
1876	22,530	2,590,552.81
1877	19,900	2,407,828.19
1878	22,460	2,662,980.82
1879	17,391	2,070,842.39
1880	15,441	1,938,234.89
1881	15,077	1,928,204.76
1882	17,174	2,219,453.80
1883	18,998	2,504,414.51
1884	21,843	2,945,574.72
1885	22,066	3,032,679.11
1886	19,356	2,663,531.83
1887	19,866	2,749,037.48
1888	22,413	3,175,400.64
1889	25,549	3,681,708.80
1890	28,080	4,060,592.77
1891	27,686	3,954,587.77
1892	22,822	3,259,897.07
1893	24,204	3,477,231.63
1894	20,544	2,929,947.41
1895	20,922	2,980,809.30
1896	20,099	2,790,242.55
1897	20,115	2,778,404.20
1898	22,281	3,095,017.75
1899	22,812	3,134,140.44
1900	25,286	3,477,842.71
1901	37,568	5,241,120.76
1902	31,627	4,342,747.70
1903	26,373	3,576,964.14
1904	23,932	3,232,716.75
1905	24,621	3,419,387.15
1906	25,546	3,526,748.58
1907	26,485	3,740,567.71
1908	29,636	4,242,710.59
1909	25,510	3,699,466.79
1910	23,253	3,795,862.89
1911	25,908	4,620,197.12
1912	24,326	4,306,068.52
1913	53,252	10,009,285.16
1914	48,724	9,291,121.46
1915	37,343	7,180,981.62
1916	37,958	7,278,280.60
1917	43,727	8,497,389.68
1918	41,319	8,236,438.18
Total	1,186,538	178,342,111.91

Timber and stone entries from passage of act June 3, 1878, to June 30, 1918.

State.	Entries.	Acres.	Amount.
Alabama	395	29,350.45	$85,515.46
Arizona	23	2,662.76	8,571.07
Arkansas	2,251	300,608.69	618,015.65
California	20,481	2,843,459.92	7,235,376.55
Colorado	3,051	376,141.90	969,120.43
Florida	914	103,384.51	287,574.50
Idaho	7,419	994,760.30	2,582,457.21
Iowa	3	119.36	298.40
Louisiana	1,573	139,713.37	348,492.11
Michigan	1,715	140,592.74	360,844.29
Minnesota	12,431	1,393,823.17	3,510,409.77
Mississippi	145	10,184.02	30,659.03
Montana	5,091	653,614.07	1,690,614.29
Nebraska	2	97.33	268.00
Nevada	52	6,502.14	16,205.74
North Dakota	81	8,646.31	22,005.78
Oklahoma	1	40.00	100.00
Oregon	26,407	3,753,398.20	9,533,581.47
South Dakota	570	62,167.76	159,881.28
Utah	28	2,920.60	7,011.42
Washington	16,210	2,149,200.45	5,456,715.66
Wisconsin	1,087	78,938.24	198,441.40
Wyoming	3,492	395,620.40	979,478.94
Total	103,422	13,445,946.69	34,101,638.40

Desert-land entries from passage of act Mar. 3, 1877, to June 30, 1918.

State or Territory.	Entries.		Acres		Amount.		
	Original.	Final.	Original.	Final.	Original.	Final.	Total.
Arizona	8,843	1,222	2,383,146.50	301,469.32	$598,257.70	$333,091.81	$931,349.51
California	22,690	4,467	4,985,078.55	813,228.46	1,262,422.72	835,566.00	2,097,988.72
Colorado	17,126	3,647	3,173,143.94	643,186.62	893,821.61	636,847.31	1,530,668.92
Dakota Territory	35	1	20,021.00	300.00	5,005.25	300.00	5,305.25
Idaho	17,482	4,504	2,982,876.46	907,977.80	747,135.41	860,392.07	1,607,527.48
Montana	31,753	14,071	5,983,889.56	2,650,376.58	1,490,067.27	2,645,913.02	4,135,980.29
Nevada	2,486	565	545,912.60	112,927.33	126,825.89	112,408.88	239,234.77
New Mexico	11,165	1,534	2,146,304.25	223,664.41	538,715.53	322,135.25	860,850.78
North Dakota	517	114	85,278.51	19,591.75	21,321.09	19,616.49	40,937.58
Oregon	6,444	1,709	1,089,597.10	274,391.56	271,976.81	270,713.28	542,690.09
South Dakota	4,067	608	608,810.58	101,041.12	151,797.37	98,728.85	250,526.22
Utah	7,831	2,474	1,366,042.76	390,234.45	348,326.69	395,710.78	744,037.47
Washington	6,032	638	993,558.99	68,221.39	259,309.15	80,497.35	339,806.50
Wyoming	16,562	6,702	5,431,768.07	1,415,068.91	914,842.46	1,419,130.70	2,333,973.16
Total	153,033	42,256	31,745,428.87	7,921,679.70	7,629,823.95	8,031,061.79	15,660,885.74

Coal-land entries from passage of act Mar. 3, 1873, to June 30, 1918.

State or Territory.	Entries.	Acres	Amount.
Alabama	2	229.40	$2,294.00
Alaska	163	37,746.27	377,468.75
Arizona	43	6,693.35	74,997.50
California	38	5,535.06	81,531.30
Colorado	1,044	157,166.62	2,317,615.60
Colorado[1]	446	58,335.65	885,779.55
Dakota Territory	8	583.57	5,835.70
Idaho	13	3,117.41	33,631.80
Montana	470	62,088.30	1,148,522.90
Nevada	8	840.11	11,602.20
New Mexico	222	26,244.67	428,983.06
North Dakota	152	8,943.59	128,880.20
Oregon	67	10,251.08	120,134.30
South Dakota	53	3,463.64	37,764.80
Utah	466	68,181.46	1,867,582.25
Washington	394	63,464.30	1,015,941.00
Wyoming	765	109,425.66	2,544,147.31
Made at General Land Office	1	7.95	159.00
Total	4,355	622,328.04	11,083,628.15

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[1] Within the Ute Indian Reservation.

Timber-culture entries from the passage of the act of Mar. 3, 1873, to June 30, 1918.

State or Territory.	Entries.			Area.			Amount.			
	Original.	Final.	Commuted.	Original.	Final.	Commuted.	Fees (original).	Fees (final).	Purchase money.	Total.
				Acres.	*Acres.*	*Acres.*				
Arizona	1,152	52	74	164,806.63	7,149.14	10,228.14	$15,224.00	$208.00	$12,779.26	$28,211.26
Arkansas	41	4	1	4,817.14	480.00	40.00	489.00	16.00	44.00	549.00
California	8,264	481	568	1,163,922.08	63,571.58	78,848.76	110,014.00	1,910.00	98,649.13	210,573.13
Colorado	27,864	3,789	660	4,332,922.19	585,243.30	98,179.52	384,938.00	15,154.00	122,722.36	522,814.36
Dakota Territory	77,446	1,309	....	12,055,642.98	185,467.24	....	1,074,862.44	4,984.79	....	1,079,847.23
Florida	3	....	....	480.00	....	....	42.00	....	....	42.00
Idaho	4,054	341	236	533,957.49	40,436.03	28,244.51	51,447.38	1,369.50	35,305.93	88,122.81
Iowa	1,044	390	40	81,378.95	31,987.87	2,330.89	11,838.83	1,560.00	3,013.62	16,364.05
Kansas	64,345	12,886	961	9,702,653.36	2,005,831.35	142,931.88	883,275.56	51,529.03	178,650.55	1,113,455.14
Louisiana	713	87	42	101,695.31	11,937.97	5,856.85	9,651.55	348.00	7,299.54	17,299.00
Minnesota	15,268	2,924	389	2,099,046.55	373,580.90	40,261.29	207,154.98	11,712.00	61,543.77	280,410.75
Montana	3,595	407	225	486,638.66	56,019.78	29,044.43	46,162.00	1,632.00	36,506.32	84,300.32
Nebraska	59,127	16,870	1,250	8,876,351.20	2,546,696.04	187,371.35	813,382.33	67,776.73	234,332.61	1,115,491.67
Nevada	46	1	....	6,292.50	160.00	....	614.00	4.00	....	618.00
New Mexico	1,612	91	55	230,316.54	12,931.60	7,837.25	21,294.00	363.00	9,796.56	31,453.56
North Dakota	1,699	7,897	781	263,123.95	1,226,605.66	120,524.80	23,446.00	31,576.83	150,661.75	205,684.58
Oregon	7,126	1,502	252	1,051,235.21	224,545.60	35,902.61	95,821.00	6,028.00	44,878.37	146,721.37
South Dakota	2,925	13,764	822	449,583.61	2,124,753.58	121,890.98	40,151.00	55,036.00	152,282.89	247,269.89
Utah	1,476	138	89	179,690.74	15,556.26	10,157.44	17,925.00	552.00	12,696.85	31,173.85
Washington	9,354	2,006	538	1,362,193.51	292,727.52	75,689.54	125,615.00	8,020.00	94,770.83	228,405.83
Wisconsin	1	1	....	40.00	40.00	....	9.00	4.00	....	13.00
Wyoming	3,123	333	126	459,556.42	50,543.08	15,288.29	41,904.00	1,332.00	19,135.91	62,367.91
Total	290,278	65,265	7,108	43,606,344.97	9,856,264.45	1,010,623.81	3,975,261.07	261,115.88	1,275,040.25	5,511,188.80

Land and scrip granted to States and Territories for educational and other purposes.

State.	Purpose of grant.	Amount granted.	Total by States.
		Acres.	
Alabama	Tuskegee Normal and Industrial Institute	25,000.00	
	Industrial School for Girls	25,000.00	
	Seminary of learning	46,080.00	
	Internal improvements	500,000.00	
	Agricultural college scrip	240,000.00	
	Common schools, section 16	911,627.00	
	Salt Springs and contiguous lands	23,040.00	
	Seat of government	1,620.00	
	University	46,080.00	
			1,818,447.00
Alaska	Common schools, sections 16 and 36, reserved (estimated).	21,009,209.00	
	Agricultural College and School of Mines, certain sections 33, reserved (estimated).	336,000.00	
			21,345,209.00
Arizona	University	246,080.00	
	Public buildings	100,000.00	
	Penitentiaries	100,000.00	
	Insane asylums	100,000.00	
	Deaf, Dumb and Blind Asylum	100,000.00	
	Miners' Hospital	50,000.00	
	Normal schools	200,000.00	
	Charitable, penal, etc	100,000.00	
	Agricultural and mechanical colleges	150,000.00	
	School of Mines	150,000.00	
	Military institutes	100,000.00	
	Payment of bonds issued to Maricopa, Pima, Yavapai, and Coconino Counties.	1,000,000.00	
	Common schools, sections 2 and 32, 16 and 36	8,093,156.00	
			10,489,236.00
Arkansas	Internal improvements	500,000.00	
	University	46,080.00	
	Public buildings	10,600.00	
	Agricultural college scrip	150,000.00	
	Common schools, section 16	933,778.00	
	Salt Springs and contiguous lands	46,080.00	
			1,686,538.00
California	Internal improvements	500,000.00	
	University	46,080.00	
	Public buildings	6,400.00	
	Agricultural and mechanical colleges	150,000.00	
	Common schools, sections 16 and 36	5,534,293.00	
			6,236,773.00
Colorado	Internal improvements	500,000.00	
	University	46,080.00	
	Public buildings	32,000.00	
	Penitentiaries	32,000.00	
	Agricultural college	90,000.00	
	Common schools, sections 16 and 36	3,685,618.00	
	Salt Springs and contiguous lands	46,080.00	
	State Agricultural College	1,600.00	
			4,433,378.00
Connecticut	Agricultural college scrip	180,000.00	
			180,000.00
Delaware	do	90,000.00	
			90,000.00
Florida	Internal improvements	500,000.00	
	Seminaries of learning	92,160.00	
	Seat of government	5,120.00	
	Agricultural college scrip	90,000.00	
	Common schools, section 16	975,307.00	
			1,662,587.00
Georgia	Agricultural college scrip	270,000.00	
			270,000.00
Idaho	Lava Hot Springs	187.30	
	University	46,080.00	
	University, Moscow	50,000.00	
	Agricultural college	90,000.00	
	Penitentiary	50,000.00	
	Public buildings	32,000.00	
	Insane asylum	50,000.00	
	Educational, charitable, etc	150,000.00	
	Normal schools	100,000.00	
	Scientific schools	100,000.00	
	Common schools, sections 16 and 36	2,963,698.00	
			3,631,965.30
Illinois	Internal improvements	500,000.00	
	Seminary of learning	46,080.00	
	Seat of government	2,560.00	
	Agricultural college scrip	480,000.00	
	Common schools, section 16	996,320.00	
	Salt Springs and contiguous lands	121,029.00	
			2,145,989.00

Land and scrip granted to States and Territories for educational and other purposes—Con.

State.	Purpose of grant.	Amount granted.	Total by States.
		Acres.	
Indiana	Internal improvements	500,000.00	
	Seminary of learning	46,080.00	
	Seat of government	2,560.00	
	Agricultural college scrip	390,000.00	
	Common schools, section 16	668,578.00	
	Salt Springs and contiguous lands	23,040.00	1,630,258.00
Iowa	Internal improvements	500,000.00	
	University	46,080.00	
	Public buildings	3,200.00	
	Agricultural college	240,000.00	
	Common schools, section 16	988,196.00	
	Salt Springs and contiguous lands	46,080.00	1,823,556.00
Kansas	Internal improvements	500,000.00	
	University	46,080.00	
	Public buildings	6,400.00	
	Agricultural college	90,000.00	
	.....do	7,682.00	
	Common schools, section 16 and 36	2,907,520.00	
	Salt Springs and contiguous lands	46,080.00	
	Game preserve	3,021.20	3,606,783.20
Kentucky	Deaf and Dumb Asylum	22,508.65	
	Agricultural college scrip	330,000.00	352,508.65
Louisiana	Internal improvements	500,000.00	
	Seminary of learning	46,080.00	
	Agricultural college scrip	210,000.00	
	Common schools, section 16	807,271.00	1,563,351.00
Maine	Agricultural college scrip	210,000.00	210,000.00
Maryland	.....do	210,000.00	210,000.00
Massachusetts	.....do	360,000.00	360,000.00
Michigan	Internal improvements	500,000.00	
	University	46,080.00	
	Public buildings	3,200.00	
	Agricultural college	240,000.00	
	Common schools, section 16	1,021,867.00	
	Salt springs and contiguous lands	46,080.00	1,857,227.00
Minnesota	Internal improvements	500,000.00	
	University	92,160.00	
	Public buildings	6,400.00	
	Agricultural college	120,000.00	
	Experimental forestry	20,000.00	
	Public park	8,392.51	
	Common schools, sections 16 and 36	2,874,951.00	
	Salt springs and contiguous lands	46,080.00	3,667,983.51
Mississippi	Internal improvements	500,000.00	
	Seminary of learning	69,120.00	
	Seat of government	1,253.16	
	Agricultural college scrip	210,000.00	
	Common schools, section 16	824,213.00	1,604,586.16
Missouri	Internal improvements	500,000.00	
	Seminary of learning	46,080.00	
	Seat of government	2,560.00	
	Agricultural college	330,000.00	
	Common schools, section 16	1,221,813.00	
	Salt springs and contiguous lands	46,080.00	2,146,533.00
Montana	University	46,080.00	
	Agricultural college	140,000.00	
	Public buildings	182,000.00	
	Deaf and dumb asylum	50,000.00	
	Reform school	50,000.00	
	School of mines	100,000.00	
	Normal schools	100,000.00	
	Militia camp	640.00	
	Observatory for university	480.00	
	Biological station	160.00	
	Common schools, sections 16 and 36	5,198,258.00	
	Fort Assinniboine for educational institutions	2,000.00	5,869,618.00

Land and scrip granted to States and Territories for educational and other purposes—Con.

State.	Purpose of grant.	Amount granted.	Total by States.
		Acres.	
Nebraska	Penitentiary	32,000.00	
	Internal improvements	500,000.00	
	University	46,080.00	
	Public buildings	12,800.00	
	Agricultural college	90,000.00	
	Common schools, sections 16 and 36	2,730,951.00	
	Salt springs and contiguous lands	46,080.00	
	Dry-land agricultural experiments	800.00	3,458,711.00
Nevada	Internal improvements	500,000.00	
	University	46,080.00	
	Penitentiary	12,800.00	
	Public buildings	12,800.00	
	Mining and mechanic arts	90,000.00	
	Common schools, sections 16 and 36 and lieu lands, act of June 16, 1880.	2,061,967.00	2,723 647.00
New Hampshire	Agricultural college scrip	150.000.00	150,000.00
New Jersey	.....do	210,000.00	210,000.00
New Mexico (act June 21, 1898).	University	111,080.00	
	Saline land (university)	1,622.86	
	Agricultural college	100,000.00	
	Improvement of Rio Grande	100,000.00	
	Penitentiary	50,000.00	
	Public buildings	32,000.00	
	Insane asylum	50,000.00	
	Deaf and dumb asylum	50,000.00	
	Reform school	50,000.00	
	Normal school	100,000.00	
	School of mines	50,000.00	
	Blind asylum	50,000.00	
	Reservoirs	500,000.00	
	Miners' hospital	50,000.00	
	Military institute	50,000.00	
	Common schools, sections 16 and 36	4,355,662.00	5,700,364.86
New Mexico (act June 20, 1910.	University	200,000.00	
	Public buildings	100,000.00	
	Insane asylums	100,000.00	
	Penitentiaries	100,000.00	
	Deaf, dumb, and blind asylum	100,000.00	
	Miners' hospitals	50,000.00	
	Normal schools	200,000.00	
	Charitable, penal, and reformatory	100,000.00	
	Agricultural and mechanical colleges	150,000.00	
	School of mines	150,000.00	
	Military institutes	100,000.00	
	Payment of bonds issued by Grant and Santa Fe Counties.	1,000,000.00	
	Common schools, sections 2 and 32	4,355,662.00	6,705,662.00
New York	Agricultural college scrip	990,000.00	990,000.00
North Carolina	.....do	270,000.00	270,000.00
North Dakota	University	86,080.00	
	Agricultural college	130,000 00	
	Public buildings	82,000.00	
	Educational, charitable, etc	170,000.00	
	Deaf and Dumb Asylum	40,000.00	
	Reform School	40,000.00	
	School of Mines	40,000.00	
	Normal school	80,000.00	
	Common schools, sections 16 and 36	2,495,396.00	3,163,476.00
Ohio	Internal improvements	500,000.00	
	Seminaries of learning	69,120.00	
	Agricultural college scrip	630,000.00	
	Common schools, section 16	724,266.00	
	Salt Springs and contiguous lands	24,216.00	1,947,602.00
Oklahoma	Normal schools	300,000.00	
	Oklahoma University	250,000.00	
	University Preparatory School	150,000.00	
	Agricultural and Mechanical College	250,000.00	
	Colored Agricultural and Normal University	100,000.00	
	Common schools, sections 16 and 36	1,375,000.00	
	Certain sections 13 and 33	669,000.00	
	Insane Asylum	1,760.25	3,095,760.25

Land and scrip granted to States and Territories for educational and other purposes—Con.

State.	Purpose of grant.	Amount granted.	Total by States.
		Acres.	
Oregon	Internal improvements	500,000.00	
	University	46,080.00	
	Public buildings	6,400.00	
	Agricultural college	90,000.00	
	Common schools, sections 16 and 36	3,399,360.00	
	Salt Springs and contiguous lands	46,080.00	
	Public park (area not yet determined).		4,087,920.00
Pennsylvania	Agricultural college scrip	780,000.00	780,000.00
Rhode Island	.....do	120,000.00	120,000.00
South Carolina	.....do	180,000.00	180,000.00
South Dakota	University	86,080.00	
	Agricultural college	160,000.00	
	Public buildings	82,000.00	
	Educational and charitable	170,000.00	
	Deaf and Dumb Asylum	40,000.00	
	Reform School	40,000.00	
	School of Mines	40,000.00	
	Normal school	80,000.00	
	Missionary work	160.00	
	Military camp ground	640.00	
	Insane Asylum	640.00	
	Common schools, sections 16 and 36	2,733,084.00	3,432,604.00
Tennessee	Agricultural college scrip	300,000.00	300,000.00
Texas	.....do	180,000.00	180,000.00
Utah	University	156,080.00	
	Agricultural college	200,000.00	
	Public buildings	64,000.00	
	Insane Asylum	100,000.00	
	Deaf and Dumb Asylum	100,000.00	
	Reform School	100,000.00	
	School of Mines	100,000.00	
	Normal schools	100,000.00	
	Blind Asylum	100,000.00	
	Reservoirs	500,000.00	
	Miners' Hospital	50,000.00	
	Common schools, sections 2, 16, 32, and 36	5,844,196.00	7,414,276.00
Vermont	Agricultural college scrip	150,000.00	150,000.00
Virginia	.....do	300,000.00	300,000.00
Washington	University	46,080.00	
	Agricultural college	90,000.00	
	Public buildings	132,000.00	
	Educational and charitable	200,000.00	
	Normal schools	100,000.00	
	Scientific schools	100,000.00	
	Common schools, sections 16 and 36	2,376,391.00	3,044,471.00
West Virginia	Agricultural college scrip	150,000.00	150,000.00
Wisconsin	Internal improvements	500,000.00	
	University	92,160.00	
	Public buildings	6,400.00	
	Agricultural college	240,000.00	
	Forestry	20,000.00	
	Common schools, section 16	982,329.00	1,840,889.00
Wyoming	University	46,080.00	
	Agricultural college	90,000.00	
	Public buildings	107,000.00	
	Penitentiary	30,000.00	
	Insane Asylum	30,000.00	
	Educational, penal, etc	290,000.00	
	Deaf and Dumb Asylum	30,000.00	
	Miners' Hospital	30,000.00	
	Fish hatcheries	5,480.00	
	Poor farm	10,000.00	
	Common schools, sections 16 and 36	3,470,009.00	4,138,569.00
	Grand total		133,426,478.98

NOTE.—In addition to above, 64,617,000 acres have been granted as swamp lands to various States.

Lands patented or certified under concessions by act of Congress to States and corporations for railroad and military wagon-road purposes from the year 1850 to June 30, 1918.

STATE GRANTS.

	Acres.
Illinois:	
Illinois Central	2,595,133.00
Mississippi:	
Mobile & Ohio River	737,130.29
Vicksburg & Meridian	199,101.51
Gulf & Ship Island	139,113.22
	1,075,345.02
Alabama:	
Mobile & Ohio	[1] 419,528.44
Alabama & Florida	399,022.84
Selma, Rome & Dalton	458,555.82
Coosa & Tennessee	67,784.96
Mobile & Girard	[2] 302,181.16
Alabama & Chattanooga	654,009.12
South & North Alabama	445,478.47
	2,746,560.81
Florida:	
Florida Central & Peninsular	741,668.27
Florida & Alabama	166,691.08
Pensacola & Georgia	1,279,236.70
Florida, Atlantic & Gulf Central	29,384.18
	2,216,980.23
Louisiana:	
Vicksburg, Shreveport & Pacific	372,092.34
New Orleans, Opelousas & Great Western	([3])
Arkansas:	
St. Louis, Iron Mountain & Southern	1,325,355.46
Little Rock & Fort Smith	1,052,082.51
Memphis & Little Rock	184,657.33
	2,562,095.30
Missouri:	
Southwest branch of the Pacific road	1,161,284.51
Hannibal & St. Joseph	611,323.35
St. Louis, Iron Mountain & Southern	65,360.31
	1,837,968.17
Iowa:	
Burlington & Missouri River	389,990.11
Chicago, Rock Island & Pacific	[4] 483,214.36
Cedar Rapids & Missouri River	161,532.81 [4] 922,824.85 244,022.96
Dubuque & Sioux City	[4] 556,406.74
Iowa Falls & Sioux City	683,057.34
Des Moines Valley (river-improvement grant)	840,171.36
Chicago, Milwaukee & St. Paul	326,216.10
McGregor & Missouri River	322,412.81
Sioux City & St. Paul	
	4,929,849.44

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[1] In the adjustment of this grant the road was treated as an entirety and without reference to the State line; hence Alabama has had approved to her more and Mississippi less than they would appear to be entitled to in proportion to the length of the road in the respective States.

[2] This grant was adjusted Apr. 24, 1893, and 302,181.16 acres were allotted to the company. The balance of the previously certified lands were ordered restored to entry under the forfeiture act of Sept. 29, 1890.

[3] Certified lands footing 719,189.79 acres were reconveyed to the United States by the governor of Louisiana Feb. 24, 1888, the grant having been forfeited by the act of July 14, 1870 (16 Stat., 277).

[4] Includes 36,685.49 acres of the Chicago, Rock Island & Pacific R. R.; 109,756.86 acres of the Cedar Rapids & Missouri River R. R.; and 77,635.22 acres of the Dubuque & Sioux City R. R., situated in the old Des Moines River grant of Aug. 8, 1846, which should be deducted from the foregoing amount. (Wolcott v. Des Moines Co., 5 Wall., 681.)

	Acres.
Michigan:	
Port Huron & Lake Michigan	37,467.44
Jackson, Lansing & Saginaw	743,787.58
Grand Rapids & Indiana	852,521.10
Flint & Pere Marquette	512,932.38
Marquette, Houghton & Ontonagon	[1] 305,929.59
Ontonagon & Brule River	34,227.08
Bay de Noquet & Marquette	128,301.05
Chicago & North Western	518,065.36
	3,133,231.58
Wisconsin:	
Chicago, St. Paul, Minneapolis & Omaha (formerly West Wisconsin)	813,706.71
Wisconsin Railroad Farm Mortgage Land Co	163,159.65
Chicago, St. Paul, Minneapolis & Omaha (formerly St. Croix & Lake Superior)	816,487.76
Branch to Bayfield	471,721.14
Chicago & North Western	546,446.20
Wisconsin Central	838,227.69
	3,649,749.15
Minnesota:	
St. Paul, Minneapolis & Manitoba (formerly first division St. Paul & Pacific)	[2] 3,259,263.84
Western R. R. (succeeded by St. Paul & Northern Pacific R. R. Co.)	
St. Paul, Minneapolis & Manitoba (formerly St. Vincent extension of the St. Paul & Pacific)	
Minnesota Central	179,734.29
Winona & St. Peter	1,680,974.92
St. Paul & Sioux City	1,126,618.55
St. Paul & Duluth	860,973.62
Southern Minnesota, from a point on the Mississippi River to Houston	546,745.44
Southern Minnesota extension (now Chicago, Milwaukee & St. Paul)	
Hastings & Dakota	377,776.15
	8,032,086.81
Minnesota, North Dakota, Montana, and Washington:	
St. Paul, Minneapolis & Manitoba, now Great Northern (main and branch), a special act (Aug. 5, 1892, 27 Stat. L., 390) to provide for indemnity for lands relinquished by the company	([3])
Kansas:	
Leavenworth, Lawrence & Galveston	[4] 249,446.13
Missouri, Kansas & Texas	[5] 976,593.22
Atchison, Topeka & Santa Fe	2,944,788.14
St. Joseph & Denver City	462,933.24
	4,633,760.73
Grand total	37,784,852.58

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[1] Excess of 131,481.71 acres originally certified under this grant reconveyed by State or entered under act Mar. 3, 1887, by Michigan Land & Iron Co. (Ltd.), grant having been forfeited in part by act March, 1889 (25 Stat., 1008).

[2] Declared to be one grant (see 32 L. D., 21).

[3] See Minnesota for original grants.

[4] Includes 186,936.72 acres of the "Osage ceded reservation," which are to be deducted from the above amount under the decision of the Supreme Court in the case of the Leavenworth, Lawrence & Galveston Railroad *v.* The United States (92 U. S., 733).

[5] Includes 270,970.78 acres in the "Osage ceded reservation," which are to be deducted under the decision cited in note 1.

CORPORATION GRANTS.

	Acres.
Union Pacific	11,934,047.39
Central Pacific	6,194,500.46
Central Pacific (successor by consolidation with Western Pacific)	458,786.66
Central Branch Union Pacific	223,080.50
Union Pacific (Kansas division)	6,175,660.63
Union Pacific (successor to Denver Pacific Ry. Co.)	807,564.76
Burlington & Missouri River in Nebraska	2,374,090.77
Sioux City & Pacific (now Missouri Valley Land Co.)	42,610.95
Northern Pacific	38,023,745.30
Oregon branch of the Central Pacific (California & Oregon)	3,160,079.07
Oregon & California	2,767,693.26
Atlantic & Pacific (now Santa Fe Pacific)	7,002,585.58
Southern Pacific (main line)	4,048,811.96
Southern Pacific (branch line)	1,583,304.81
Oregon Central	128,618.13
New Orleans Pacific	1,001,943.40
Grand total	85,927,123.63

WAGON ROADS.

From Lake Erie to Connecticut Western Reserve	80,773.54
From Lake Michigan to Ohio River	170,580.24
From Fort Wilkins, Copper Harbor, Mich., to Green Bay, Wis	302,930.96
From Fort Wilkins, Copper Harbor, Mich., to Wisconsin State line	221,013.35
Oregon Central Military Co. (now California & Oregon Land Co.)	859,579.89
Corvallis and Yaquina Bay	83,716.76
Willamette Valley and Cascade Mountain	861,511.86
Dalles Military Road	556,827.04
Coos Bay Military Road	105,240.11
Grand total	3,242,173.75

Withdrawals under the act of Mar. 15, 1910 (36 Stat., 237), during the fiscal year ended June 30, 1918.

State.	Pending July 1, 1917.	Rejected before withdrawal, 1917-18.	Now pending.	Remaining withdrawn July 1, 1917.	Withdrawn 1917-18.	Restored 1917-18.	Remaining withdrawn July 1, 1918.
	Acres.	*Acres.*	*Acres.*	*Acres.*	*Acres.*	*Acres.*	*Acres.*
Arizona	640.00			32,630.76	640.00	15,030.76	18,240.00
Colorado	24,209.34	9,798.17	14,411.17	79,547.05		10,213.17	69,333.88
Idaho				21,164.77			21,164.77
Nevada				35,387.13		30,865.57	4,521.56
Oregon	909.91		909.91	75,497.64			75,497.64
Utah				22,385.22		22,385.22	
Wyoming	6,340.48	320.00	4,064.49	24,258.90	1,955.99	1,981.06	24,233.83
Total	32,099.73	10,118.17	19,385.57	290,871.47	2,595.99	80,475.78	212.991.68

State desert-land segregations under section 4 of the act of Aug. 18, 1894 (28 Stat., 372-422), and the acts amendatory thereof, commonly designated as the Carey Act, with the action taken thereon during the fiscal year ended June 30, 1918.

State.	Pending July 1, 1917.	Applied for 1917-18.	Rejected before segregation, 1917-18.	Now pending.	Remaining segregated, July 1, 1917.
Arizona	13,905.16			13,905.16	
Colorado	44,912.69	39,625.73	7,333.56	77,204.86	206,633.30
Idaho	754,367.60		262,201.38	477,555.10	543,890.04
Montana	33,913.92			33,913.92	118,528.28
Nevada	23,503.28		18,063.28	5,440.00	36,328.59
New Mexico					7,564.68
Oregon [1]	133,177.86	560.00	9,111.83	95,427.07	[1] 269,670.65
Utah	189,407.95		5,874.22	183,533.73	64,853.74
Wyoming	150,549.62	15,482.47	50,197.40	115,831.21	1,021,527.01
Total	1,343,738.08	55,668.20	352,781.17	1,002,811.05	[1] 2,268,996.29

State.	Segregated, 1917-18.	Canceled, 1917-18.	Patented, 1917-18.	Remaining segregated, July 1, 1918.
Colorado		15,827.02		190,806.28
Idaho	14,611.12	70,866.58	11,354.15	476,280.43
Montana		80.00		118,448.28
Nevada		24,082.57		12,246.02
New Mexico				7,564.68
Oregon [1]	29,199.46	74,198.02		[1] 224,672.09
Utah		4,999.15		59,854.59
Wyoming	3.48	79,318.59	289.81	941,922.09
Total	43,814.06	269,371.93	11,643.96	[1] 2,031,794.46

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[1] In Oregon 6,014.49 acres patented and reconveyed remain segregated and are included in the "Remaining segregated" July 1, 1917, and 1918. Also during the fiscal year the period of segregation of 41,994.76 acres has been extended for an additional five years under the act of Feb. 26, 1917.

Acreage included in orders of coal, oil, and phosphate withdrawals and restorations promulgated during the fiscal year ended June 30, 1918, by States.

State.	Coal.		Petroleum.		Phosphate.	
	With-drawn.	Restored.	With-drawn.	Restored.	With-drawn.	Restored.
	Acres.	*Acres.*	*Acres.*	*Acres.*	*Acres.*	*Acres.*
Colorado		5,045				
Idaho		333,604			49,340	
Montana		300,457			198,690	30,034
New Mexico	9,369	27,419				
North Dakota		185,872				
Utah		12,181	10,461			
Washington		3,119				
Total	9,369	867,780	10,461		248,030	30,034

Report of withdrawals made under the act of June 25, 1910 (36 Stat., 847), as amended by act of Aug. 24, 1912 (37 Stat., 497), and the restorations therefrom, from July 1, 1917, to June 30, 1918.

State.	Withdrawals.			Restorations.				
	No.	Date of approval.	Area.	No.	Date of approval.	Area.	Outstanding, July 1, 1917.	Outstanding, June 30, 1918.
Power site reserves.			*Acres.*			*Acres.*		
Alabama							120	120
Alaska	674	Jan. 23, 1918	3,635	674	May 29, 1918	520		
	684	Apr. 27, 1918	8,600				69,300	81,015
			12,235			520		
Arkansas							22,354	22,354
Arizona	670	Dec. 5, 1917	44				300,324	300,368
California	577	July 24, 1917	78					
	641	July 30, 1917	1,600					
	642	July 24, 1917	760					
	646	....do....	40					
	648	Sept. 27, 1917	840					
	652	Sept. 7, 1917	560					
	655	....do....	3,035					
	656	Sept. 27, 1917	257					
	657	....do....	1,320					
	667	Nov. 26, 1917	43					
	671	Dec. 12, 1917	4,151					
	673	Dec. 31, 1917	355					
	682	Apr. 11, 1918	50					
	683	....do....	8					
	688	May 29, 1918	120				264,006	277,223
			13,217					
Colorado	636	July 17, 1917	10				276,504	276,514
Idaho	638	Sept. 27, 1917	76	246	Sept. 7, 1917	240		
	651	Aug. 16, 1917	1,620	248	July 17, 1917	40		
	654	Aug. 31, 1917	1,202	252	Nov. 22, 1917	40		
	666	Nov. 26, 1917	80	665	....do....	22		
	668	Nov. 22, 1917	40					
	675	Mar. 15, 1918	23					
	681	Apr. 24, 1918	257				262,494	265,467
			3,315			342		
Michigan							1,240	1,240
Minnesota							12,309	12,309
Montana	643	Sept. 3, 1917	2	259	May 16, 1918	40		
	676	Feb. 11, 1918	120	260	May 29, 1918	40		
	678	....do....	55					
	679	Mar. 2, 1918	18				164,297	164,412
			195			80		
Nebraska							761	761
Nevada							27,361	27,361
New Mexico							62,602	62,602
Oregon	629	Aug. 7, 1917	7,823	253	Nov. 22, 1917	160		
	631	July 10, 1917	2,488	257	May 16, 1918	600		
	632	....do....	202					
	633	July 24, 1917	6,566					
	634	July 17, 1917	2,751					
	644	Aug. 23, 1917	40					
	645	July 17, 1917	160					
	649	July 23, 1917	238					
	653	Aug. 16, 1917	127					
	658	Nov. 14, 1917	16					
	659	Dec. 12, 1917	44,439					
	660	....do....	3,963					
	661	....do....	21,590					
	662	....do....	8,352					
	663	Nov. 26, 1917	196					
	664	Dec. 12, 1917	4,783					
	672	....do....	80					
	680	Apr. 24, 1918	1,440					
	686	May 4, 1918	160				317,318	421,972
			105,414			760		

Report of withdrawals made under the act of June 25, 1910 (36 Stat., 847), as amended by act of Aug. 24, 1912 (37 Stat., 497), and the restorations therefrom, from July 1, 1917, to June 30, 1918—Continued.

State.	Withdrawals.			Restorations.				
	No.	Date of approval.	Area.	No.	Date of approval.	Area.	Outstanding, July 1, 1917.	Outstanding, June 30, 1918.
Power site reserves—Continued.			*Acres.*			*Acres.*		
Utah	677	Feb. 18, 1918	4					
	690	June 7, 1918	200				447,424	447,628
			204					
Washington	639	July 17, 1917	281	250	Oct. 27, 1917	13		
				256	Mar. 21, 1918	400		
				261	June 19, 1918	115	113,780	113,533
			281			528		
Wyoming	647	Sept. 29, 1917	1,662					
	650	Aug. 16, 1917	928				86,903	89,493
			2,590					
Total			137,505			2,230	2,429,097	2,564,372
Public water reserves.								
Arizona							13,066	13,066
California							52,474	52,474
Colorado							480	480
Idaho							7,210	7,210
Montana	51	Nov. 10, 1917	1,960				3,304	5,264
Nevada	52	Dec. 20, 1917	417				4,336	4,753
New Mexico	53	Feb. 11, 1918	640				2,286	2,926
Oregon							2,482	2,482
Utah	54	Feb. 11, 1918	1,080	6	Apr. 11, 1918	280	33,827	34,627
Washington							40	40
Wyoming	43	Aug. 3, 1917	31	11	Jan. 18, 1918	1,550	82,831	81,312
Total			4,128			1,830	202,336	204,634
Well drilling reserves.								
Montana	1	Sept. 7, 1917	40					40
Nevada	2	Sept. 29, 1917	80					80
Total			120					120
Reservoir sites.								
Montana							9,080	9,080
North Dakota							478	478
Oregon							10,619	10,619
Washington							35,943	35,943
Wyoming							5,020	5,020
Total							61,140	61,140
Miscellaneous withdrawals for classification.								
Alabama		Apr. 28, 1917	19,600					19,600
Alaska							230,000	230,000
California							30,880	30,880
Colorado		Nov. 22, 1917	1,727					1,727
Oregon					Mar. 19, 1918	300,000		
					May 11, 1918	150,000	2,300,000	1,850,000
Total			21,327			450,000	2,560,880	2,132,207
Grand total			163,080			454,060	5,253,453	4,962,473

Power projects—Permits and easements granted under the acts of Feb. 15, 1901 (31 Stat., 790), and Mar. 4, 1911 (36 Stat., 1253), respectively, and payments made in connection therewith during fiscal year ending June 30, 1918.

State or Territory.	Permittee or grantee.	Character of permit or grant.	Project.	Payment.
Alaska	Stannard, E. T.	Preliminary	Power	$124.00
Do.	Alaska Gastineau Mining Co.	Final	do.	1,740.00
Arizona	Calumet & Arizona Mining Co.	do.	Transmission line.	20.00
Do.	New Cornelia Copper Co.	do.	do.	60.00
California	Coachella V. I. & E. Co.	do.	do.	440.00
Do.	Southern Sierras Power Co.	do.	do.	1,481.35
Do.	do.	do.	do.	
Colorado	Burd Creek Mining Co.	do.	do.	10.00
Do.	Colorado Power Co.	do.	do.	20.00
Idaho	Shoshone County Power Co.	do.	do.	5.00
Do.	Washington Power Co.	do.	do.	15.00
Do.	do.	do.	do.	
Do.	Salmon River Power & Light Co.	do.	Power	60.00
Do.	Nevada Power Co.	do.	Transmission line.	165.00
Do.	Utah Power & Light Co.	do.	do.	910.00
Montana	Economy Mines Co.	do.	do.	5.00
Do.	Penobscot Mining Co.	do.	do.	40.00
Do.	Rohn O.	do.	do.	
Do.	Montana Power Co.	do.	do.	5,184.00
Do.	do.	do.	do.	
Do.	do.	do.	do.	
Do.	Chicago, Milwaukee & St. Paul Ry. Co.	do.	do.	20.00
Do.	Great Falls Power Co.	do.	do.	615.00
New Mexico	Parsons Mining Co.	do.	do.	5.00
Oregon	Kelly, J. G.	Preliminary	Power	202.35
Do.	do.	do.	do.	
Utah	United States Fuel Co.	Final	Transmission	5.00
Washington	Pacific Power & Light Co.	do.	do.	185.00
Do.	Okanogan Valley Power Co.	do.	Power	
Wyoming	McNiell I.	do.	do.	

Public and Indian lands entered each year ended June 30, from 1911 to 1918, inclusive.

State or Territory.	1912	1913	1914	1915	1916	1917	1918
	Acres.	*Acres.*	*Acres.*	*Acres.*	*Acres.*	*Acres.*	*Acres.*
Alabama	90,615.04	56 245.68	39,485.65	26,154.63	21,220.16	14,265.54	9,319.44
Alaska	5,244.95	108.67	3,144.15	22,036.02	33,940.98	32,741.40	12,977.00
Arizona	669,292.97	770,449.59	765,962.11	291,557.70	1,881,044.63	1,431,627.45	1,236,786.96
Arkansas	247,318.58	178,065.19	174,665.29	165,080.01	184,359.50	160,645.85	97,476.06
California	872,301.68	937,230.43	878,874.21	1,001,663.53	640,361.85	754,964.55	286,041.59
Colorado	1,354,326.05	1,458,107.84	1,433,305.88	2,666,068.22	3,076,601.22	2,092,705.73	1,301,903.56
Florida	183,061.64	96,277.34	70,302.88	66,988.42	58,455.29	43,624.78	36,319.10
Idaho	860,840.25	1,030,312.55	947,553.93	1,144,276.80	1,066,352.41	769,455.55	556,903.62
Illinois							
Indiana							
Iowa							
Kansas	71,915.69	68,775.14	41,651.71	68,190.59	212,288.36	114,772.39	46,457.75
Louisiana	16 491.13	16 309.44	19 781.87	15 618.56	18,358.07	16,545.15	13,714.36
Michigan	17,222.57	13,636.92	16,900.73	14,981.80	10,751.32	9,570.89	6,913.21
Minnesota	397,158.46	191,762.18	323,305.20	296,534.64	268,140.25	109,455.90	59,877.25
Mississippi	27,708.14	20,599.64	19,918.35	18,007.56	18,381.11	15,205.05	10,443.34
Missouri	21,968.55	4,470.06	2,813.91	2,572.69	1,744.36	1,324.80	320.00
Montana	3,687,420.90	4,717,117.51	5,386,964.28	4,187,364.36	4,038,658.80	4,206 096.60	2,659,889.77
Nebraska	1,394,388.57	997,812.22	1,037,342.10	372,323.52	219,504.29	109,825.04	66,203.35
Nevada	261,188.07	173,790.66	194,308.33	290,138.53	212,554.83	92,871.29	124,540.78
New Mexico	1,050,399.79	2,324,250.89	1,870,138.66	3,266,995.81	2,831,204.86	1,850,779.88	1,023,661.76
North Dakota	384,218.11	418,685.76	604,264.16	365,719.63	337,089.13	321,494.13	148,153.35
Oklahoma	97,563.31	65,959.39	51,568.38	50,953.86	54,043.83	57,984.20	33 275.33
Oregon	745,869.45	561,810.14	839,990.89	738,401.77	561,739.40	428,255.14	252,666.17
South Dakota	696,546.70	468,658.33	378,469.32	321,763.13	1,045,854.96	1,212 326.90	328 745.15
Utah	549,883.11	262,863.44	189,781.34	373,507.39	335,101.87	461,178.17	284,224.35
Washington	382,565.57	357,323.51	294,930.73	324,384.09	188,488.03	483,158.16	186,778.58
Wisconsin	16,099.44	11,300.18	10,430.11	8,116.32	5,615.18	4,026.52	3,613.57
Wyoming	503,090.10	665,255.75	927,007.95	760,815.11	1,721,289.23	1,455,964.22	1,166,347.51
Gen. Land Office		40.00					
Total	14,574,688.82	15,867,222.45	16,522,852.12	16,861,214.69	19,043,152.92	16,201,794.28	9,874,331.61

Public lands surveyed and remaining unsurveyed in public land States, including Alaska.

	Land area.	Surveyed during fiscal year ending June 30, 1918.	Surveyed to June 30, 1918.	Unsurveyed to June 30, 1918.	Resurveyed to June 30, 1918.
	Acres.	*Acres.*	*Acres.*	*Acres.*	*Acres.*
Alabama	32,818,560	12	32,818,560	....	....
Alaska	378,165,760	183,225	1,046,479	377,119,281	....
Arizona	72,838,400	1,504,874	29,265,516	43,572,884	16,920
Arkansas	33,616,000	....	33,616,000	....	....
California	99,617,280	199,700	80,579,460	19,037,820	268,396
Colorado	66,341,120	154,837	63,563,461	2,777,659	614,164
Florida	35,111,040	1,201	30,934,070	4,176,970	....
Idaho	53,346,560	993,080	34,875,857	18,470,703	23,300
Illinois	35,867,520	....	35,867,520	....	....
Indiana	23,068,800	....	23,068,800	....	....
Iowa	35,575,040	....	35,575,040	....	....
Kansas	52,335,360	....	52,335,360	....	....
Louisiana	29,061,760	....	29,061,760	....	....
Michigan	36,787,200	6	36,787,200	....	....
Minnesota	51,749,120	185	49,828,091	1,921,029	....
Mississippi	29,671,680	....	29,671,680	....	....
Missouri	43,985,280	....	43,985,280	....	....
Montana	93,568,640	1,902,254	74,487,300	19,081,340	159,727
Nebraska	49,157,120	....	49,157,120	....	553,242
Nevada	70,285,440	1,104,190	44,088,656	26,196,784	5,118
New Mexico	78,401,920	1,076,386	59,357,545	19,044,375	87,346
North Dakota	44,917,120	409	42,987,788	1,929,332	....
Ohio	26,073,600	....	26,073,600	....	....
Oklahoma	44,424,960	25	44,424,960	....	....
Oregon	61,188,480	194,157	52,768,830	8,419,650	13,287
South Dakota	49,195,520	32,552	48,772,628	422,892	....
Utah	52,597,760	1,057,881	32,773,465	19,824,295	....
Washington	42,775,040	202,099	34,581,078	8,193,962	....
Wisconsin	35,363,840	21	35,363,840	....	....
Wyoming	62,460,160	71,775	58,779,547	3,680,613	673,047
Total	1,820,366,080	8,678,869	1,246,496,491	573,869,589	2,414,547

NOTE.—In Alabama, Arkansas, Michigan, Oklahoma, and Wisconsin, the lands surveyed last year were not regarded as public land when the surrounding lands were originally surveyed and are counted in the aggregate for each State.

Estimated area of existing national forests, June 30, 1918.

[Approximately 88 per cent is public.]

	Acres.		Acres.
Alabama	57,705	New Hampshire	371,819
Alaska	21,013,205	New Mexico	9,514,590
Arizona	12,709,458	North Carolina	88,202
Arkansas	1,487,468	Oklahoma	61,640
California	24,136,399	Oregon	15,440,860
Colorado	14,854,713	Porto Rico	65,950
Florida	675,420	South Dakota	1,313,221
Idaho	19,140,438	Utah	7,951,534
Maine	29,414	Virginia	258,254
Michigan	163,878	Washington	11,624,374
Minnesota	1,581,014	West Virginia	13,700
Montana	19,004,583	Wyoming	8,619,855
Nebraska	217,808		
Nevada	5,555,764	Total area	175,951,266

	Acres.
Area added to national forests during year	861,460
Area excluded from national forests during year	1,027,418
Net decrease in area through recomputation by Forest Service	134,936
Area embraced in temporary forest withdrawals June 30, 1918	198,825
Area of existing national forests June 30, 1917	176,252,160
Area of existing national forests June 30, 1918	175,951,266

National forests, by States, together with estimated areas thereof, June 30, 1918.

State or territory.	Forest.	Area.
		Acres.
Alabama	Alabama	57,706
Alaska	Chugach	5,532,205
	Tongass	15,481,000
Total		21,013,205
Arizona	Apache	1,276,400
	Coconino	1,763,397
	Coronado[1]	1,357,828
	Crook	885,000
	Dixie[1]	17,680
	Kaibab	1,072,900
	Prescott	1,619,955
	Sitgreaves	893,720
	Tonto	2,033,760
	Tusayan	1,788,818
Total		12,709,458
Arkansas	Arkansas	958,290
	Ozark	529,178
Total		1,487,468
California	Angeles	1,061,708
	California	1,062,622
	Cleveland	813,616
	Crater[1]	57,022
	Eldorado[1]	835,900
	Inyo[1]	1,337,780
	Klamath[1]	1,734,665
	Lassen	1,321,343
	Modoc	1,582,859
	Mono[1]	874,861
	Monterey	300,494
	Plumas	1,432,860
	Santa Barbara	1,928,294
	Sequoia	2,021,609
	Shasta	1,586,880
	Sierra	1,662,560
	Siskiyou[1]	461,795
	Stanislaus	1,104,412
	Tahoe[1]	1,209,077
	Trinity	1,746,147
Total		24,136,504
Colorado	Arapaho	680,081
	Battlement	677,840
	Cochetopa	930,220
	Colorado	1,149,594
	Durango	704,000
	Gunnison	951,310
	Hayden[1]	72,000
	Holy Cross	605,700
	La Sal[1]	27,620
	Leadville	1,056,520
	Montezuma	812,100
	Pike	1,256,112
	Rio Grande	1,221,140
	Routt	919,946
	San Isabel	651,200
	San Juan	745,000
	Sopris	656,000
	Uncompahgre	867,860
	White River	871,080
Total		14,854,713
Florida	Florida	675,420
Idaho	Boise	1,118,114
	Cache[1]	507,779
	Caribou[1]	711,680
	Challis	1,269,990
	Clearwater	907,846
	Coeur d'Alene	790,234
Idaho	Idaho	1,187,561
	Kaniksu[1]	326,642
	Lemhi	1,100,562
	Minidoka[1]	531,129
	Nesperce	1,686,679
	Payette	863,674
	Pend Orielle	874,738
	St. Joe	975,668
	Salmon	1,642,380
	Sawtooth	1,177,821
	Selway	1,882,680
	Targhee[1]	1,026,740
	Weiser	666,680
Total		19,148,426
Maine	White Mountain[1]	29,414
Michigan	Michigan	163,873
Minnesota	Minnesota	312,478
	Superior	1,238,536
Total		1,551,014
Montana	Absaroka	957,710
	Beartooth	661,980
	Beaverhead	1,365,030
	Bitterroot	1,155,868
	Blackfeet	1,130,980
	Cabinet	1,043,282
	Custer	512,879
	Deerlodge	964,980
	Flathead	2,008,365
	Gallatin	909,430
	Helena	920,480
	Jefferson	1,173,656
	Kootenai	1,622,340
	Lewis and Clark	826,380
	Lolo	1,181,603
	Madison	1,086,868
	Missoula	1,365,191
	Sioux[1]	114,541
Total		19,004,528
Nebraska	Nebraska	217,868
Nevada	Dixie[1]	290,380
	Eldorado[1]	600
	Humboldt	1,458,430
	Inyo[1]	75,380
	Mono[1]	488,519
	Nevada	1,280,980
	Tahoe[1]	62,127
	Toiyabe	1,924,680
Total		5,555,706
New Hampshire	White Mountain[1]	371,839
New Mexico	Carson	926,301
	Coronado[1]	128,152
	Datil	2,941,302
	Gila	1,600,063
	Lincoln	1,490,038
	Manzano	937,919
	Santa Fe	1,481,360
Total		9,514,360
North Carolina	Pisgah	85,365
Oklahoma	Wichita	61,640
Oregon	Cascade	1,084,435
	Crater[1]	1,079,325
	Deschutes	1,509,560

[1] Forest in two States.

National forests, by States, together with estimated areas thereof, June 30, 1918—Con.

State or territory.	Forest.	Area.	State or territory.	Forest.	Area.
		Acres.			*Acres.*
Oregon	Fremont	985,714	Virginia	Natural Bridge	106,108
	Klamath[1]	8,893		Shenandoah[1]	152,146
	Malheur	1,262,840	Total		258,254
	Minam	479,818	Washington	Chelan	724,110
	Ochoco	819,080		Columbia	942,200
	Oregon	1,140,866		Colville	816,000
	Santiam	719,983		Kaniksu[1]	376,763
	Siskiyou[1]	1,255,250		Okanogan	1,541,000
	Siuslaw	833,441		Olympic	1,652,000
	Umatilla	564,985		Rainier	1,561,470
	Umpqua	1,221,391		Snoqualmie	1,042,000
	Wallowa	1,058,537		Washington	1,490,000
	Wenaha[1]	461,954		Wenaha[1]	321,831
	Whitman	999,493		Wenatche	1,157,000
Total		15,440,860	Total		11,624,374
Porto Rico	Luquillo	65,950	West Virginia	Shenandoah[1]	13,700
South Dakota	Black Hills[1]	602,011	Wyoming	Ashley[1]	6,060
	Harney	627,942		Bighorn	1,136,200
	Sioux[1]	83,268		Black Hills[1]	179,121
Total		1,313,221		Bridger	717,977
Utah	Ashley[1]	981,613		Caribou[1]	7,360
	Cache[1]	317,506		Hayden[1]	365,620
	Dixie[1]	458,890		Medicine Bow	511,382
	Fillmore	779,290		Shoshone	1,609,000
	Fishlake	723,591		Targhee[1]	399,070
	La Sal[1]	535,670		Teton	1,971,192
	Manti	855,722		Washakie	804,873
	Minnidoka[1]	92,280		Wyoming	912,000
	Powel	704,700			
	Sevier	802,660	Total		8,619,855
	Uinta	1,043,135			
	Wasatch	656,477	Total of 151 national forests		175,951,266
Total		7,951,534			

[1] Forest in two States.

List of bird reserves.

Name of reservation.	Date.	Location.	Area.
			Acres.
Pelican Island	Mar. 14, 1903	East Florida coast	5.50
Breton Island	Oct. 4, 1904 Nov. 11, 1905	Southeast coast of Louisiana	Unknown.
Stump Lake	Mar. 9, 1905	North Dakota	27.39
Huron Islands	Oct. 10, 1905	Lake Superior, Mich	Unknown.
Siskiwit Islands	do	do	Do.
Passage Key	do	Tampa Bay, Fla	36.37
Indian Key	Feb. 10, 1906	do	90.00
Tern Islands	Aug. 8, 1907	Mouths of Mississippi River, La	Unknown.
Shell Keys	Aug. 17, 1907	South Louisiana coast	Do.
Three Arch Rocks	Oct. 14, 1907	West Oregon coast	Do.
Flattery Rocks	Oct. 23, 1907	West Washington coast	Do.
Quillayute Needles	do	do	Do.
Copalis Rock	do	do	Do.
East Timbalier Island	Dec. 7, 1907	South Louisiana coast	Do.
Mosquito Inlet	Feb. 24, 1908	East Florida Coast	Do.
Tortugas Keys	Apr. 6, 1908	Florida Keys, Fla	Do.
Klamath Lake	Aug. 8, 1908	Oregon and California	Do.
Key West	do	Florida Keys, Fla	Do.
Lake Malheur	Aug. 18, 1908	Oregon	Do.
Chase Lake	Aug. 28, 1908	North Dakota	Do.
Pine Island	Sept. 15, 1908	West Florida coast	Do.
Matlatcha Pass	Sept. 26, 1908	do	Do.
Palma Sola	do	do	Do.
Island Bay	Oct. 23, 1908	Florida	Do.
Loch Katrine	Oct. 26, 1908	Wyoming	Do.
Hawaiian Islands	Feb. 3, 1909	Hawaii	Do.
East Park	Feb. 25, 1909	California	Do.
Cold Springs	do	Oregon	Do.
Shoshone	do	Wyoming	Do.
Pathfinder	do	do	Do.
Bellefourche	do	South Dakota	Do.
Strawberry Valley	do	Utah	Do.
Salt River	do	Arizona	Do.

List of bird reserves—Continued.

Name of reservation.	Date.	Location.	Area.
			Acres.
Deer Flat	Feb. 25, 1909	Idaho	Unknown.
Minidoka	do	do	Do.
Willow Creek	do	Montana	Do.
Carlsbad	do	New Mexico	Do.
Rio Grande	do	do	Do.
Keechelus Lake	do	Washington	Do.
Kachess Lake	do	do	Do.
Clealum Lake	do	do	Do.
Bumping Lake	do	do	Do.
Conconully	do	do	Do.
Bering Sea	Feb. 27, 1909	Alaska	Do.
Pribilof [1]	do	do	Do.
Tuxedni	do	do	Do.
Farallon	do	California	Do.
Culebra	do	Porto Rico	Do.
Yukon Delta	do	Alaska	Do.
St. Lazaria	do	do	Do.
Bogoslof	Mar. 2, 1909	do	Do.
Clear Lake	Apr. 11, 1911	California	Do.
Forrester Island	Jan. 11, 1912	Alaska	Do.
Hazy Islands	do	do	Do.
Niobrara	do	Nebraska	[2] 14.64
Green Bay	Feb. 21, 1912	Wisconsin	1.87
Chamisso Island	Dec. 7, 1912	Alaska	Unknown.
Pishkun	Dec. 17, 1912	Montana	Do.
Desecheo Island	Dec. 19, 1912	Porto Rico	Do.
Gravel Island	Jan. 9, 1913	Wisconsin	Do.
Aleutian Islands	Mar. 3, 1913	Alaska	Do.
Canal Zone [3]	Mar. 19, 1913	Panama	Do.
Walker Lake	Apr. 21, 1913	Arkansas	Do.
Petit Bois Islands	May 6, 1913	Alabama and Mississippi	Do.
Anaho Island	Sept. 4, 1913	Nevada	247.73
Smith Island	June 6, 1914	Washington	Unknown.
Dungeness Spit	Jan. 20, 1915	do	226.02
Ediz Hook	do	do	[2] 83.00
Mille Lacs	May 14, 1915	Minnesota	Unknown.
Big Lake	Aug. 6, 1915	Arkansas	Do.
San Francisco Bay	Aug. 9, 1916	California	141.00
North Platte	Aug. 21, 1916	Nebraska	Unknown.
BIRD RESERVES ENLARGED OR REDUCED.			
Pelican Island	Jan. 26, 1909	Florida (enlarged)	Unknown.
Mosquito Inlet	Apr. 2, 1909	do	Do.
Cold Springs	Nov. 25, 1911	Oregon (enlarged)	Do.
Clear Lake	Jan. 13, 1912	California (reduced)	Do.
Minidoka	Feb. 21, 1912	Idaho (enlarged)	Do.
Niobrara	Nov. 14, 1912	Nebraska (enlarged)	[2] 15,253.7
Deer Flat	Apr. 21, 1915	Idaho (reduced)	Unknown.
Klamath Lake	May 14, 1915	Oregon and California (reduced)	Do.

[1] Transferred to Bureau of Fisheries.

[2] Approximate area.

[3] Under jurisdiction of Isthmian Canal Commission. Canal Zone, strictly speaking, not a bird reservation, but birds are protected by Executive order.

Total reservations, excluding Canal Zone, 71.

Aggregate cash receipts from the disposal of public and Indian lands from May 20, 1785, to June 30, 1918.

Fiscal years.	Cash sales.	Amount of fees and commissions.	Total receipts from fees and disposal of public lands.	Receipts from sales of Indian lands.	Miscellaneous receipts.	Aggregate receipts from all sources.
May 20, 1785, to June 30, 1880						$208,059,657.14
1881	$3,534,550.98	$860,833.65	$4,396,384.63	$1,006,691.63	$6,727.90	5,409,804.16
1882	6,628,775.92	1,124,531.15	7,753,307.07	634,617.22	6,591.75	8,394,516.04
1883	9,657,032.28	1,423,329.10	11,080,361.38	625,404.27	8,118.05	11,713,883.70
1884	10,304,582.49	1,536,410.58	11,840,993.07	938,137.26	10,274.76	12,789,405.09
1885	6,223,926.74	1,462,188.06	7,686,114.80	933,483.52	8,821.86	8,628,420.18
1886	5,757,891.06	1,654,876.25	7,412,767.31	1,607,729.63	10,587.40	9,031,084.34
1887	9,246,321.33	1,537,600.39	10,783,921.72	1,484,302.30	20,784.85	12,289,008.87
1888	11,203,071.95	1,498,000.05	12,701,072.00	821,113.77	24,951.65	13,547,137.42
1889	8,018,254.50	1,251,971.23	9,270,225.73	389,524.72	26,150.89	9,685,901.34
1890	6,349,174.24	1,121,696.07	7,470,870.31	293,062.30	16,585.00	7,780,517.61
1891	4,160,099.07	944,938.65	5,105,037.72	318,333.42	5,849.00	5,429,220.14
1892	3,322,865.01	1,064,805.26	4,387,670.27	456,681.84	15,757.58	4,860,109.69

Aggregate cash receipts from the disposal of public and Indian lands from May 20, 1785, to June 30, 1918—Continued.

Fiscal years.	Cash sales.	Amount of fees and commissions	Total receipts from fees and disposal of public lands.	Receipts from sales of Indian lands.	Miscellaneous receipts.	Aggregate receipts from all sources.
1893	$3,193,280.64	$998,184.65	$4,191,465.29	$284,752.65	$3,516.20	$4,479,734.14
1894	1,653,080.71	1,021,205.08	2,674,285.79	91,981.03	1,557.50	2,767,824.32
1895	1,116,090.07	750,710.59	1,866,800.66	149,879.48	16,773.89	2,033,454.03
1896	1,053,905.59	793,557.82	1,847,463.41	214,700.42	44,197.84	2,106,361.67
1897	917,911.19	678,469.55	1,596,380.74	438,716.31	52,834.23	2,087,931.28
1898	1,291,076.10	853,265.50	2,144,341.60	100,317.49	33,336.09	2,277,995.18
1899	1,703,988.32	890,702.17	2,594,690.49	442,913.73	32,533.12	3,070,137.34
1900	2,899,731.83	1,157,081.03	4,056,812.86	239,769.39	83,175.85	4,379,758.10
1901	2,966,542.86	1,340,894.29	4,307,437.15	585,661.27	79,062.37	4,972,160.79
1902	4,139,268.47	1,740,820.18	5,880,088.65	288,666.68	93,171.85	6,261,927.18
1903	8,960,471.18	1,597,147.48	10,557,618.66	308,939.14	158,185.85	11,024,743.65
1904	7,445,902.84	1,349,990.89	8,795,893.73	333,757.62	153,690.63	9,283,341.98
1905	4,849,766.06	1,286,621.93	6,136,387.88	791,807.67	89,615.72	7,017,811.38
1906	4,885,988.82	1,642,488.56	6,528,477.38	967,532.50	89,514.02	7,585,523.90
1907	7,728,114.30	1,819,159.21	9,547,273.51	1,892,805.70	113,098.79	11,553,178.00
1908	9,760,570.19	1,731,883.57	11,492,453.76	997,972.52	225,283.18	12,715,709.46
1909	7,698,337.03	1,536,890.67	9,235,227.70	2,334,885.47	330,136.61	12,216,415.39
1910	6,342,744.75	2,028,892.35	8,371,637.10	2,037,551.68	1,054,735.28	11,463,924.06
1911	5,783,693.39	1,461,514.30	7,195,187.69	2,822,600.71	[1] 1,022,119.20	11,089,927.60
1912	5,437,502.07	1,234,216.47	6,671,718.54	2,284,538.37	[1] 1,016,791.09	9,973,048.00
1913	2,746,546.52	1,540,994.15	4,287,540.67	2,118,469.34	[1] 549,494.80	6,955,504.81
1914	2,650,761.84	1,654,085.02	4,304,846.86	1,844,802.77	47,677.90	6,148,367.63
1915	2,331,368.44	1,581,805.48	3,913,173.92	1,556,630.97	28,386.01	5,394,948.20
1916	1,769,860.33	1,660,933.33	3,430,793.66	1,972,299.49	41,468.44	5,444,561.59
1917	1,935,954.53	1,641,860.14	3,577,814.67	[2] 2,445,582.52	[3] 126,233.35	6,149,630.54
1918	2,050,575.58	1,160,350.88	3,210,926.46	1,935,773.73	211,816.04	5,358,516.23
Total						491,430,102.17

[1] Includes reclamation water-right charges.

[2] Includes $152.88 originally erroneously reported as Indian sale.

[3] Does not include $152.88 mentioned in footnote 2.

Reclamation water-right charges under act of Aug. 9, 1912 (37 Stat., 265) were collected from Jan. 1, 1913, by the Reclamation Service.

Amounts accrued and paid to States for purposes of education, or of making public roads and improvements on accounts of grants, 2, 3, and 5 per cent of net proceeds of sales of public lands lying within said States.

State.	Total to June 30, 1916.	Fiscal year 1917.	Aggregate to June 30, 1917, inclusive.
Alabama	$1,079,301.62	$111.46	$1,079,413.08
Arizona	17,295.84	2,480.18	19,776.02
Arkansas	326,974.35	538.31	327,512.66
California	1,126,174.98	8,568.16	1,134,743.14
Colorado	488,285.51	7,173.36	495,458.87
Florida	142,945.75	389.65	143,335.40
Idaho	269,758.59	5,945.19	275,703.78
Illinois	1,187,908.89		1,187,908.89
Indiana	1,040,255.26		1,040,255.26
Iowa	633,638.10		633,638.10
Kansas	1,127,588.32	216.67	1,127,804.99
Louisiana	468,831.88		468,831.88
Michigan	587,869.96	138.13	588,008.09
Minnesota	591,971.23	685.32	592,656.55
Mississippi	1,070,341.38	128.58	1,070,469.96
Missouri	1,060,979.56	64.30	1,061,043.86
Montana	495,022.44	22,033.51	517,055.95
Nebraska	567,047.68	1,655.32	568,703.00
Nevada	38,896.18	1,212.42	40,108.60
New Mexico	135,220.46	2,580.12	137,800.58
North Dakota	537,430.25	415.66	537,845.91
Ohio	999,353.01		999,353.01
Oklahoma	63,402.45	774.15	64,176.60
Oregon	741,052.44	3,666.87	744,719.31
South Dakota	339,068.40	1,925.14	340,993.54
Utah	101,862.34	5,828.41	107,690.75
Washington	422,556.19	1,870.89	424,427.08
Wisconsin	586,582.63	46.04	586,628.67
Wyoming	243,736.83	9,194.17	252,931.00
Total	16,491,352.52	77,642.01	16,568,994.53

Lands certified or patented on account of railroad and wagon road grants during the fiscal year ended June 30, 1918.

Grant.	State.	Area.
State grants:		*Acres.*
Total St. Paul, Minneapolis & Manitoba R. R.	North Dakota	14.65
Total wagon roads, Corvallis & Yaquina Bay		80.00
Corporations:		
Atlantic & Pacific R. R. (now Santa Fe Pacific R. R.)	Arizona	51,108.63
Do	New Mexico	580,161.98
Central Pacific R. R	Idaho	566.47
Northern Pacific R. R	do	200.63
Do	Montana	118,728.92
Do	Washington	104,063.16
Oregon & California R. R	Oregon	2,086.16
Southern Pacific R. R. (main line)	California	85,808.12
Southern Pacific R. R. (branch line)	do	40.08
Total		943,385.13
Total certified or patented during year		943,399.78
Total canceled during year		72,119.99
Total disposed of during year		1,015,519.77
Total received during year		665,372.40

Alleged fraudulent entries acted upon during year.

Kind of entry.	Pending June 30, 1917.	Received.	Approved.	Canceled.	Otherwise disposed of.	Total.	Pending June 30, 1918.	Hearings ordered, General Land Office.
Homesteads:								
Originals	7,451	8,283		414	7,343	7,757	7,977	244
Finals	460	2,413	1,921	18	461	2,400	473	31
Cash	31	266	125	6	144	275	22	5
Desert land:								
Originals	789	1,618		12	1,655	1,667	740	
Finals	258	130	1	2	248	251	137	
Timber culture:								
Originals	4						4	
Finals	2						2	
Timber and stone:								
Originals	540	359		4	231	235	664	13
Finals	10	76	20	1	22	43	43	3
Isolated tracts:								
Originals	114	87		4	41	45	156	
Cash	90	54	13		30	43	101	
Mineral:								
Applications	472	147			130	130	489	15
Entry	101	132			165	165	68	10
Soldiers' additional entry	533	493	453	125	2	580	446	
Selections:								
State	1,186	968			409	409	1,745	7
Forest	221	51		1	110	111	161	1
Railroad	348	36			19	19	365	1
Indian allotment	625	32			154	154	503	
Squatters' claims	48						48	1
Mineral locations	72	12					84	
Total	13,355	15,157	2,533	587	11,164	14,284	14,22	337

Indictments, convictions, acquittals, and dismissals, fines imposed and paid, and prison sentences, June 30, 1917, to June 30, 1918.

Offenses.	Indictments.	Convictions.	Prison sentences.	Fines imposed.	Fines paid.	Acquittals and dismissals.
Timber trespass	5	9	....	$326	$226	1
Conspiracy	1	2	....	1,700	2,700	2
Perjury	7	7	4	2,020	1,000	2
Section 215, Penal Code	1	2	1	....	500	2
Embezzlement	1	....	....	....	....	....
Section 19, Penal Code	10	2	2	....	....	28
Section 37, Penal Code	2	4	1	....	....	4
Locators' act	1	1	1	....	....	....
False certificates of jurats	2	1	1	....	....	....
Section 148, Penal Code	....	1	....	....	....	....
Filing false affidavits	....	....	....	1,000	1,000	....
Subornation of perjury	....	2	....	1,000	500	....
Procuring entry to be made	....	1	....	500	500	....
Total	30	32	10	6,546	6,426	39

Class, number, and area of patents issued during fiscal year ended June 30, 1918.

Class.	No.	Area.
		Acres.
Commuted homestead	2,209	304,173.26
Timber and stone	356	38,538.79
Public sale	2,383	353,263.57
Cash, miscellaneous	408	26,193.59
Desert land	2,093	340,281.25
Desert-land reclamation	3	241.35
Desert-land segregation	2	11,643.96
Town site	8	605.43
Town lot	1,445	440.405
Homestead	25,160	6,012,086.326
Forest homestead	1,005	119,172.81
Indian homestead	7	480.00
Reclamation homestead	739	56,885.42
Soldier's additional homestead	453	20,906.54
Military bounty land warrant	30	457.40
Forest lieu selection	72	7,332.58
Timber culture	3	160.00
Mineral	514	24,002.436
Indian	10,150	1,089,765.62
Coal	48	5,362.29

Class.	No.	Area.
		Acres.
Coal deposits	34	(1)
Private-land claims	16	7,499.91
Small holding claims	3	75.45
Swamp	27	26,017.62
Umatilla Indian land	4	520.00
Abandoned military reservation	44	7,347.53
Choctaw scrip	5	105.85
Choctaw lands	5	1,967.70
Agrcultural college scrip	1	160.00
Surveyor general's scrip	2	160.00
Sioux half-breed scrip	2	80.00
Valentine scrip	4	9.01
Virginia military warrant	1	100.00
Villa site	98	356.87
Railroad	28	943,719.78
Cemetery site	2	11.37
Special acts	1,048	152,338.60
Supplemental patents, Apr. 14, 1914	208	(2)
Total	48,620	9,552,482.217

[1] Surface area reported elsewhere, 3,177.13 acres.

[2] Area of supplemental patents act Apr. 14, 1914, 30,606.67 acres.

	Acres.
Patented area under enlarged homestead acts	4,036,468.74
Patented area under Kinkaid Act	468.519.16
Patented area coal reserved	805,665.59
Patented area act July 17, 1914 (phosphate, etc.)	196,341.26
All included in the above report.	
Area of Indian fee patents not included in the above report	726,967.381

Area by offices of entries patented during the fiscal year ended June 30, 1918.

State.	Office.	Area.
		Acres.
Alabama	Huntsville	160.00
	Lebanon	80.00
	Montgomery	16,306.24
	St. Stephens	870.09
Alaska	Fairbanks	892.287
	Juneau	1,583.196
	Nome	2,966.277
Arizona	Phoenix	215,876.389
Arkansas	Camden	13,882.70
	Harrison	76,094.57
	Little Rock	21,109.52
California	El Centro	8,394.16
	Eureka	8,791.36
	Independence	12,572.278
	Los Angeles	153,791.268
	Sacramento	42,731.939
	San Francisco	33,427.08
	Susanville	27,395.93
	Visalia	23,482.36
		1,417.95
Colorado	Del Norte	11,107.643
	Denver	112,397.231
	Durango	23,787.201
	Glenwood Springs	40,418.382
	Hugo	55,407.30
	Lamar	239,738.27
	Leadville	4,731.992
	Montrose	39,506.223
	Pueblo	147,096.03
	Sterling	242,909.94
Florida	Gainesville	51,055.63
Idaho	Blackfoot	149,278.03
	Boise	64,537.581
	Coeur d'Alene	23,006.964
	Hailey	98,884.926
	Lewiston	24,255.518
		260.00
Illinois	General Land Office.	160.00
		80.00
Iowa	Dubuque	120.00
Kansas	Dodge City	82,672.21
	Topeka	6,392.60
	Wichita	157.12
Louisiana	Baton Rouge	13,890.97
Louisiana	Monroe	80.55
	New Orleans	120.07
	Opelousas	1,242.85
Michigan	Marquette	5,946.99
	Ionia	80.00
		120.00
Minnesota	Cass Lake	89,336.10
	Crookston	128,252.83
	Duluth	19,713.42
		4,214.08
Mississippi	Augusta	146.45
	Jackson	16,035.44
	St. Stephens	809.30
	Pontotoc	160.10
	Washington	1,368.90
		1,987.70
Missouri	St. Louis	160.00
	Springfield	2,888.276
Montana	Billings	211,535.60
	Bozeman	157,110.159
	Glasgow	360,075.135
	Great Falls	270,394.621
	Havre	533,905.881
	Helena	127,758.882
	Kalispell	24,501.349
	Lewistown	391,095.809
Montana	Miles City	469,869.79
	Missoula	79,948.723
		987,812.12
Nebraska	Alliance	96,698.35
	Broken Bow	187,275.44
	Lincoln	2,736.13
	North Platte	86,880.88
	O'Neill	13,897.12
	Valentine	108,211.83
		322.36
Nevada	Carson City	20,262.989
	Elko	28,371.07
		114.97
New Mexico	Clayton	124,738.84
	Fort Sumner	134,285.19
	Las Cruces	31,555.635
	Roswell	75,069.44
	Santa Fe	648,008.35
	Tucumcari	62,967.39
		4,408.41
North Dakota	Bismarck	28,129.51
	Devils Lake	160.00
	Dickinson	96,764.71
	Fargo	80.00
	Minot	26,781.686
	Williston	81,826.49
		1,753.61
Ohio	Cincinnati	800.29
	Steubenville	160.00
		100.00
Oklahoma	El Reno	40.00
	Guthrie	41,108.894
	Lawton	121.00
		5,438.41
Oregon	Burns	50,491.686
	La Grande	52,534.36
	Lakeview	67,864.09
	Portland	14,620.882
	Roseburg	22,894.036
	The Dalles	106,928.419
	Vale	26,764.37
		5,047.05
South Dakota	Bellefourche	46,831.212
	General Land Office.	5.00
	Gregory	21,641.989
	Lemmon	113,201.02
	Pierre	19,731.05
	Rapid City	58,339.433
	Timber Lake	109,821.604
		114,723.49
Utah	Salt Lake City	119,434.831
	Vernal	181,104.072
		1,253.05
Washington	North Yakima	46,909.62
	Seattle	58,270.539
	Spokane	26,164.477
	Vancouver	18,208.29
	Walla Walla	19,774.53
	Waterville	37,778.364
		12,198.82
Wisconsin	Wausau	5,570.06
Wyoming	Buffalo	35,064.417
	Cheyenne	190,270.572
	Douglas	70,400.165
	Evanston	19,491.64
	Lander	26,433.42
	Sundance	68,813.73
		140.00
Total		9,552,652.217

	Referred to other divisions.	Total.	Pending June 30, 1918.		
			For office action.	For action elsewhere.	Total.
Cases of all kinds					
	50,170	67,648			
	65,151	80,434			
	48,107	61,062			
	45,379	62,067			
	49,439	68,058			
	42,361	56,125			
	39,022	59,307			
	36,889	55,265			
	35,800	52,376			
	28,697	44,248			
	31,367	46,561			
Total	30,418	46,717	54,447	39,482	93,929
	502,800	699,868	54,447	39,482	93,929
Railroad and wagon roads					
	68,409.79	198,476.84			
	76,863.71	185,719.29			
	68,937.32	324,669.04			
	68,628.60	71,447.26			
	71,747.32	185,351.15			
	15,566.45	21,034.28			
	10,179.48	256,677.63			
	32,510.91	134,556.80			
	43,312.44	59,829.50			
	33,111.40	147,333.54			
	13,960.92	158,485.31			
Total	71,379.68	82,480.85	343,796.86	1,349,915.47	1,693,712.33
	74,608.02	1,826,061.49	343,796.86	1,349,915.47	1,693,712.33
Stats					
	70,757.34	440,367.26			
	3,331.05	394,767.08			
	0,922.87	361,390.01			
	76,849.86	400,890.19			
	3,789.68	431,988.93			
	1,724.03	185,835.63			
	1,592.00	581,492.87			
	2,838.76	344,267.34			
	3,562.44	737,999.05			
	2,646.76	122,988.68			
	9,974.08	382,763.63			
Total	2,341.78	267,250.93	2,248,619.03	3,036,044.76	5,284,663.79
	0,330.65	4,651,951.60	2,248,619.03	3,036,044.76	5,284,663.79

			Pending June 30, 1918.		
	Referred to other divisions.	Total.	For office action.	For action elsewhere.	Total.
Cases of all kinds	988	49,608	5,577	....	5,577
	18,309	78,782	20,456	10,585	31,041
	106,379	106,379	1,902	....	1,902
	1	2,753	708	246	954
	816	15,367	2,233	6,828	9,061
	451	869	251	818	1,069
	233	5,702	679	734	1,413
	147	11,087	6,679	8,543	15,222
	....	4	6	....	6
	133,865	141,111	2,312	340	2,652
	381	3,172	863	918	1,781
	232,477	270,088	9,710	....	9,710
	8,753	14,996	3,071	10,470	13,541
Total	502,800	699,868	54,447	39,482	93,929

Railroads and wagon roads	63,000.00	1,214,453.47	343,796.86	1,349,915.47	1,693,712.33
	611,608.02	611,608.02	....	....	....
Total	674,608.02	1,826,061.49	343,796.86	1,349,915.47	1,693,712.33
State	774,838.36	3,056,459.31	2,216,598.46	1,829,450.96	4,046,049.42
	,352,623.55	1,352,623.55	120.21	....	120.21
	242,868.74	242,868.74	31,900.36	1,206,593.80	1,238,494.16
Total	,370,330.65	4,651,951.60	2,248,619.03	3,036,044.76	5,284,663.79
Miscellaneous	6,160.66	517,741.60	50,239.06	1,060,626.20	1,110,865.26
	....	115,897.76	56,856.80	74,723.49	131,580.29
	15,040.00	15,409.04	4,569.45	38,643.06	43,212.51
	12,727.94	12,887.94	638.70	611,424.52	612,063.22
Total	33,928.60	661,936.34	112,304.01	1,785,417.27	1,897,721.28
Carey Act segregations	....	398,114.95	616,032.61	398,848.50	1,014,881.11
Aggregate	,078,867.27	7,538,064.38	3,320,752.51	6,570,226.00	9,890,978.51

Miscellaneous surveys.

nding beginning of year.				Disposed of.				
Surveys.	Town sites (miles).	Reports of examination for obliteration (miles).	All other special surveys (miles).	Total miles.	Cost of office work per mile.	Cost of field work per mile.	Total average cost per mile.	Pending end of year (miles).
10	6	....	....	7.00	....	....	....	....
38	60	....	....	....	....	....	....	60.0
15	....	125.0	....	125.00	$0.40	$26.27	$26.67	56.0
9	....	[8] 13.0	....	[3] 11.00	....	....	....	[8] 14.0
8	....	21.0	43.15	69.15	4.44	30.51	34.95	....
9	....	....	....	.38	98.66	550.32	648.98	....
....	....	....	....	....	....	....	....	....
....	2	....	....	2.00	100.10	244.07	344.17	....
4	....	....	41.00	[6] 135.50 111.00	4.77	53.10	57.87	209.0
2	....	....	50.95	84.03	7.07	43.11	50.18	16.5
3	....	....	3.93	3.93	12.73	68.22	80.96	....
18	....	....	....	....	....	....	....	....
6	....	....	65.80	[7] 33.99 21.91	6.54 9.76	49.14	58.90	9.9
....	....	251.5	46.25	297.75	.76	8.63	9.38	....
....	3	....	42.00	44.00	1.92	12.19	14.11	1.0
122	71	[8] 13.0 397.5	307.08	176.49 759.15	....	....	....	[8] 14.0 412.4
....	....	....	....	....	3.06	26.56	29.61	....

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[7] Field cost borne by claimant.

Expenditures during the fiscal year ended June 30, 1918, in connection with surveying activities.

	Salaries, offices of surveyors general.	Contingent expenses, offices of surveyors general.	Surveying the public lands.	Deposits by individuals for surveying public lands.	Surveying within land grants (reimbursable).	Miscellaneous.[1]	Indian surveys.	Total.
Alaska	$13,835.00	$2,092.10	[2]$51,211.01	$2,341.36		$1,299.11		$70,778.58
Arizona	14,978.44	474.85	54,899.45	8,394.14	$13,939.25	1,640.23	$0.50	94,326.37
California	14,287.72	1,166.02	42,950.98	8,880.68		1,090.46	1,144.72	69,320.58
Colorado	22,054.24	1,026.95	46,778.60	5,011.69		1,272.01	9.25	76,152.74
Idaho	17,915.46	326.29	54,504.78	1,962.50		1,352.74	9.67	76,090.44
Montana	20,561.39	305.55	65,080.14	24,550.01	553.41	1,445.42	12,746.50	125,242.42
Nebraska			30,315.35			281.02		30,597.37
Nevada	12,727.80	264.55	32,597.90	1,411.00	4,594.66	788.47		52,374.38
New Mexico	19,156.16	570.31	46,186.60	1,255.05		1,406.48	26,217.08	94,791.68
Oregon	13,250.73	287.92	40,345.88	745.32		776.24	6,850.75	62,206.74
South Dakota	5,100.00	29.80				155.00		5,284.80
Utah	15,493.10	328.96	40,592.43	4,033.75		821.16	1,513.68	62,783.08
Washington	9,662.49	566.73	31,523.98	967.17		962.30	6,634.46	50,417.13
Wyoming	11,748.07	136.45	44,026.48	16.00		916.11		55,843.11
General Land Office	266.22	3,321.97	53,989.57	2,545.17	505.80	1,927.45		62,556.18
Total	191,096.82	10,837.45	635,003.15	62,133.84	19,593.12	16,134.20	55,126.61	988,765.60

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[1] Includes "Surveying coal lands in Alaska," "Appraisal and sale of abandoned military reservations," and "Increase of compensation, Department of the Interior."

[2] Includes expenditures by disbursing officers other than surveyors general in Alaska.

Sales of Indian lands during fiscal year ended June 30, 1918.

Land office—Indian tribe.	Entries and segregations.				Receipts, sales, and interest.
	Number.		Acres.		
	Original.	Final.	Original.	Final.	
Arizona:					
Phoenix					$357.75
California:					
El Centro—Yuma	6	5	240.00	204.50	5,182.[illegible]
Eureka—Round Valley	1		160.00		4,[illegible]
San Francisco—Round Valley	15	3	3,115.48	480.00	30,808.94
Colorado:					
Durango—					
Ute (acts June 15, 1880, and July 28, 1882)	180	28	43,194.95	4,171.69	6,378.[illegible]
Southern Ute (act Feb. 20, 1895)	120	94	21,377.62	12,153.09	1,571.47
Glenwood Springs—Ute (acts June 15, 1880, and July 28, 1882)	224	130	37,578.67	17,934.74	26,762.75
Montrose—Ute (acts June 15, 1880, and July 28, 1882)	445	34	57,562.99	4,398.95	24,487.77
Idaho:					
Blackfoot—Pocatello town lots		2			[illegible]
Coeur d'Alene—					
Act June 21, 1906	24	105	2,636.04	12,755.99	9,634.78
Town lots		79			1,536.95
Kansas:					
Dodge City—Osage	7		349.99		591.94
Topeka—Osage	2		160.00		478.58
Minnesota:					
Cass Lake—Chippewa	126	648	13,097.13	91,633.67	110,[illegible].57
Crookston—					
Chippewa	233	923	29,162.01	134,934.64	131,174.72
Red Lake	2	32	92.00	3,782.70	12,[illegible].95
Duluth—Chippewa	21	22	3,396.86	2,216.37	2,718.19
Montana:					
Billings—					
Crow	430	110	86,992.75	12,968.61	98,387.13
Town lots¹		18			
Glasgow—					
Fort Peck	536	157	115,063.32	26,110.19	315,[illegible].46
Town lots¹	120	270			
Kalispell—					
Flathead	93	58	5,399.48	6,512.19	54,005.70
Town lots¹	98	64			
Villa sites¹		115		426.64	
Missoula—					
Flathead	116	84	11,799.14	10,836.46	60,228.65
Town lots¹	389	9			
North Dakota:					
Bismarck—Standing Rock	35	1	5,308.72	80.00	5,064.50
Minot—Devils Lake	4	4	277.69	391.17	977.[illegible]
Fort Berthold—					
Act June 1, 1910	59	341	7,613.85	52,076.06	218,442.[illegible]
Town lots¹	121	58			7,168.[illegible]
Oklahoma:					
Guthrie—					
Wichita	3		250.92		152.[illegible]
Cheyenne and Arapahoe		10		844.93	19,082.[illegible]
Kiowa, Comanche, and Apache	7	46	986.62	7,206.42	62,421.[illegible]
Lawton town lots		86			9,797.61
Hospital fund					27,[illegible].19
Oregon:					
La Grande—Umatilla	21	24	1,128.49	2,028.46	1,777.[illegible]
Portland—					
Siletz	1		671.22		20,[illegible].65
Town lots		51			3,681.62
South Dakota:					
Gregory—					
Rosebud	85	195	11,952.53	28,780.10	44,[illegible]
Pine Ridge	73	25	25,507.69	3,918.89	11,178.33
Lemmon—					
Standing Rock	71	403	15,412.19	62,826.56	156,437.[illegible]
Town lots¹		9			
Timber Lake—					
Cheyenne River	146	654	30,994.80	101,347.26	288,178.46
Standing Rock	63	120	12,538.40	20,279.49	65,847.43
Town lots¹	167	149			

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[1] Moneys received for these town lots and villa sites included in aggregate "Receipts, sales, and interest" for each reservation.

Sales of Indian lands during fiscal year ended June 30, 1918—Continued.

Land office—Indian tribe.	Entries and segregations.				Receipts, sales, and interest.
	Number.		Acres.		
	Original.	Final.	Original.	Final.	
Utah:					
Vernal—					
Uintah	202	106	44,782.48	13,722.97	48,972.81
Town lots [1]	117	70			
Washington:					
Spokane—					
Colville	131	118	19,458.68	13,890.31	8,436.14
Town lots [1]	90	44			
Spokane		7		670.00	760.25
Town lots		36			637.00
Waterville—					
Colville	120	76	20,958.82	10,534.10	19,052.51
Town lots [1]		70			
Wyoming:					
Lander—Shoshone	28	40	3,499.40	4,567.87	6,428.53
Total	4,791	5,742	631,315.93	663,683.00	1,935,377.44

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[1] Moneys received for these town lots and villa sites included in aggregate "Receipts, sales, and interest" or each reservation.

Entries made and expenses incurred at district land offices during fiscal year ended June 30, 1918.

Location.	Number of applications, entries, etc. (original and final).	Area.			Receipts for allowed applications and entries.[1]				Indians.[2]	Total earnings.[3]	Expenses.		
		Entered.		Patented.	Fees and commissions.		Purchase money.	Total.			Salaries and commissions, registers and receivers.	Incidental.	Total.
		Original.	Final.		Indian lands.	Public lands.							
		Acres.	*Acres.*	*Acres.*									
Alabama, Montgomery	369	9,310.44	16,688.71	16,306.240		$2,423.34	$8,841.12	$11,264.46		$11,031.91	$2,813.10	$1,447.47	$4,260.57
Alaska:													
Fairbanks	83	1,954.61	1,006.88	892.287		201.27	2,532.50	2,733.77		31,107.90	757.62	2,406.30	3,163.92
Juneau	346	11,023.32	3,658.62	1,583.196		1,834.90	21,401.98	23,236.88		57,170.68	4,892.72	2,719.81	7,612.53
Nome	35		990.97	2,966.277		151.95	2,505.00	2,656.95		8,515.30	331.71	1.20	332.91
Arizona, Phoenix	4,125	1,236,786.93	163,859.33	215,876.389		27,514.39	47,976.01	75,490.40	$357.75	75,566.42	5,716.67	8,907.32	14,623.99
Arkansas:													
Camden	404	13,732.61	18,769.68	13,882.700		2,550.42	7,212.20	9,762.62		9,772.26	2,589.20	1,608.72	4,197.92
Harrison	1,064	42,893.87	48,092.37	76,094.570		6,710.47	3,770.36	10,480.83		10,518.43	4,469.43	2,855.48	7,324.91
Little Rock	817	40,849.57	30,101.95	21,109.520		6,036.90	4,554.61	10,591.51		11,157.89	3,991.50	3,825.50	7,817.00
California:													
El Centro	329	17,334.03	17,468.15	8,394.160	$48.16	1,992.86	25,340.45	27,381.47	5,182.26	32,645.62	2,879.65	3,652.55	6,532.20
Eureka	202	8,331.51	9,142.03	8,791.360	9.60	1,678.69	4,466.10	6,154.39	4,905.52	11,059.91	2,132.36	15.23	2,147.59
Independence	309	24,223.58	22,222.59	12,572.278		3,638.06	7,169.19	10,807.25		13,146.55	3,550.17	161.78	3,711.95
Los Angeles	1,139	87,698.53	74,201.29	153,791.258		12,684.82	21,059.15	33,743.97		41,907.12	5,558.33	7,505.61	13,063.94
Sacramento	834	36,096.52	56,766.35	42,731.939		8,045.14	17,435.28	25,480.42		25,031.68	6,000.00	4,635.97	10,635.97
San Francisco	704	48,564.08	42,448.12	33,427.080	18.00	7,130.67	19,378.95	26,527.62	30,808.94	53,206.82	6,000.00	3,396.73	9,396.73
Susanville	366	21,072.09	32,275.40	27,395.930		3,502.34	5,981.37	9,483.71		14,673.92	3,563.58	1,850.31	5,413.89
Visalia	534	42,205.77	36,383.99	23,482.360		6,387.18	13,578.08	19,965.26		21,954.15	5,770.64	3,666.18	9,436.82
Indian and private land grants				1,417.950									
Colorado:													
Del Norte	166	13,624.42	10,102.19	11,107.643		1,781.42	2,832.25	4,613.67		6,564.84	2,250.42	560.56	2,810.98
Denver	1,427	77,644.14	158,427.40	112,397.231		16,898.52	33,008.59	49,907.11		57,424.39	6,000.00	5,892.57	11,892.57
Durango	341	21,649.43	15,582.01	23,787.201	5,292.31	3,455.54	15,549.10	24,296.95	7,949.97	32,627.00	5,924.91	2,097.32	8,022.23
Glenwood Springs	1,254	202,299.80	48,866.34	40,418.382	3,321.22	17,832.43	8,132.52	29,286.17	35,762.76	65,780.77	6,000.00	3,883.15	9,883.15
Hugo	374	16,771.47	62,533.50	55,407.300		5,793.22	2,648.94	8,442.16		8,481.66	6,000.00	3,546.73	9,546.73
Lamar	2,073	220,807.30	298,689.23	239,738.270		31,798.92	7,694.03	39,492.95		45,950.97	6,000.00	5,793.57	11,793.57
Leadville	204	17,749.84	5,330.09	4,731.992		2,479.78	3,854.15	6,333.93		6,652.43	2,471.73	16.20	2,487.93
Montrose	374	10,387.06	27,659.00	39,506.223	4,360.51	3,324.72	4,658.04	12,343.27	24,497.77	39,206.89	5,970.31	3,833.89	9,804.20
Pueblo	3,296	458,802.29	291,028.71	147,096.030		47,312.52	31,327.91	78,640.43		83,389.86	6,000.00	7,553.11	13,553.11
Sterling	1,700	92,459.19	281,341.79	242,909.940		20,797.32	16,091.21	36,888.53		39,003.84	6,000.00	5,801.87	11,801.87
Florida, Gainesville	1,005	36,319.10	63,315.17	51,055.030		7,178.21	8,371.57	15,549.78		15,568.04	5,497.88	5,262.66	10,760.54

Idaho:													
Blackfoot	2,742	237,204.65	269,884.28	140,278.030		31,578.96	39,453.40	71,032.36	30.00	76,804.30	6,000.00	6,714.27	12,714.27
Boise	1,381	84,545.83	112,463.88	64,587.581		12,211.70	20,305.19	32,516.89		42,360.58	6,000.00	4,283.95	10,283.95
Coeur d'Alene	229	6,246.22	11,080.51	23,006.954	623.24	2,364.68	10,588.67	13,576.59	11,471.74	24,891.05	3,960.08	2,556.23	6,516.31
Halley	2,141	150,991.09	194,119.59	98,884.925		19,583.57	40,819.17	60,402.74		63,893.44	6,000.00	7,129.65	13,129.65
Lewiston	522	75,005.29	51,296.52	24,255.518		5,518.93	7,019.09	12,538.02		12,392.75	5,531.12	1,467.13	6,998.25
Indian and private land grants				260.000									
Illinois				240.000									
Iowa				120.000									
Kansas:													
Dodge City	437	37,163.48	33,895.57	32,672.210		4,550.98	3,922.25	8,473.23	591.94	9,065.17	3,832.66	3,525.73	7,358.39
Topeka	164	8,784.28	10,362.35	6,392.600		1,446.90	711.52	2,158.42	478.53	3,096.65	1,884.72	7.34	1,892.06
Louisiana, Baton Rouge	398	13,714.36	16,942.27	13,890.970		4,050.96	5,525.57	9,576.53		9,409.43	4,025.62	4,342.57	8,368.19
Michigan:													
Marquette	214	6,913.21	9,088.11	5,946.990		1,729.01	5,096.98	6,825.99		6,560.13	2,287.80	17.58	2,305.38
Indian and private land grants				120.000									
Minnesota:													
Cass Lake	97	2,177.26	3,718.97	89,336.100	9,932.32	1,128.43	1,009.55	12,070.30	110,256.87	122,235.90	6,000.00	3,470.70	9,470.70
Crookston	112	5,611.26	7,990.51	128,252.830	11,003.52	1,934.97	522.40	13,460.89	144,180.64	157,790.06	6,000.00	2,728.41	8,728.41
Duluth	367	6,740.73	18,476.67	19,713.420	280.43	2,075.88	4,658.43	7,014.74	2,710.18	9,947.40	2,640.82	1,602.12	4,242.94
Indian and private land grants				4,214.080									
Mississippi:													
Jackson	413	10,443.24	17,438.22	16,035.440		3,010.29	10,669.73	13,680.02		13,602.94	3,343.20	2,310.80	5,654.00
Indian and private land grants				1,987.700									
Missouri, Springfield	58	320.00	3,454.34	2,888.276		186.55	1,831.01	2,017.56		2,292.39	396.88	1,076.92	1,473.80
Montana:													
Billings	1,123	49,519.99	174,010.48	211,535.600	630.20	17,382.88	4,443.62	22,456.70	98,387.12	126,471.59	5,116.67	4,864.78	9,981.45
Bozeman	1,111	192,318.22	138,462.17	157,110.159		17,480.14	14,470.74	31,950.88		31,583.83	6,000.00	2,566.97	8,566.97
Glasgow	5,281	631,492.79	593,533.99	360,075.135	10,185.41	73,254.32	78,401.75	161,841.48	315,981.45	454,979.57	6,000.00	10,225.81	16,225.81
Great Falls	2,934	178,242.28	324,434.88	270,394.621		30,717.74	43,746.96	74,464.70		72,808.58	6,000.00	9,924.39	15,924.39
Havre	4,799	335,272.65	694,023.11	533,905.881		59,026.77	56,729.98	115,756.75		151,999.83	6,000.00	11,766.56	17,766.56
Helena	2,126	204,972.43	145,044.85	127,758.882		27,084.21	58,144.53	85,228.74		87,124.79	6,000.00	4,098.85	10,098.85
Kalispell	240	20,351.94	8,701.63	24,501.349	470.87	3,058.20	1,337.47	4,866.54	54,635.79	59,793.78	4,806.85	650.81	5,457.66
Lewistown	3,882	227,580.17	535,457.79	391,095.809		44,364.09	146,931.28	191,295.37		194,025.51	6,000.00	9,203.79	15,203.79
Miles City	4,853	525,769.23	722,500.16	469,869.790		86,109.54	43,075.89	129,185.43		130,235.92	6,000.00	10,973.07	16,973.07
Missoula	330	75,106.38	20,423.21	79,940.733	1,032.92	4,728.64	8,790.18	14,551.74	60,229.03	74,744.30	6,000.00	2,374.87	8,374.87
Indian and private land grants				937,812,120									

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[1] Moneys reported under the heading "Receipts for allowed applications and entries" may in several cases exceed the total earnings from all sources for an individual office. This is due to the fact that lands are considered entered only when a certificate of allowance issues. The receipts where the receipts for "Allowed applications and entries" exceed the total earnings of an office include allowances during the fiscal year 1918, whereas its moneys were accounted for and reported as earned during the preceding fiscal year irrespective of whether the papers ever become an entry. This table does not include number and area of Indian Lands. See Indian table.

[2] These columns embrace moneys that are credited to the United States; for detailed earnings see following table.

Entries made and expenses incurred at district land offices during fiscal year ended June 30, 1918—Continued.

Location.	Number of applications, entries, etc. (original and final).	Area.			Receipts for allowed applications and entries.				Indians.	Total earnings.	Expenses.		
		Entered.		Patented.	Fees and commissions.		Purchase money.	Total.			Salaries and commissions, registers and receivers.	Incidental.	Total.
		Original.	Final.		Indian lands.	Public lands.							
		Acres.	*Acres.*	*Acres.*									
Nebraska:													
Alliance	473	20,736.78	97,203.22	96,690.380		$3,862.02	$14,984.91	$18,846.93		$18,763.13	$3,973.60	$2,833.98	$6,807.58
Broken Bow	394	17,750.00	142,156.57	187,275.440		3,040.05	7,160.18	10,200.23		10,428.18	3,512.16	1,908.66	5,420.82
Lincoln	47	2,325.72	2,224.83	2,736.130		462.17	2,886.96	3,349.13		3,347.53	1,326.64	241.73	1,568.37
North Platte	202	5,420.79	69,553.28	86,590.830		1,890.96	1,876.91	3,767.87		3,771.87	2,603.48	1,462.86	4,066.34
O'Neill	80	3,913.93	15,343.70	13,597.120		610.12	1,030.00	1,640.12		1,649.72	1,430.32	1,249.51	2,679.83
Valentine	396	16,066.16	108,718.87	103,211.820		2,686.38	24,361.66	27,048.04		39,121.76	3,833.35	1,959.22	5,792.57
Indian and private land grants				322.500									
Nevada:													
Carson City	515	93,346.62	28,670.36	20,262.989		4,870.61	24,020.73	28,891.34		26,321.02	4,886.86	1,472.96	6,359.82
Elko	450	31,194.16	28,814.08	28,371.670		4,560.22	11,270.39	15,830.61		12,380.36	4,115.68	2,933.26	7,048.94
Indian and private land grants				1,149.700									
New Mexico:													
Clayton	1,389	124,256.24	168,592.59	124,730.840		17,412.72	7,586.24	24,998.96		25,700.82	6,000.00	6,231.29	12,231.29
Fort Sumner	890	153,922.33	65,359.49	134,285.100		13,371.09	3,231.85	16,602.94		16,646.69	6,000.00	4,626.58	10,626.58
Las Cruces	1,287	166,976.46	75,545.94	31,555.625		12,460.97	16,217.98	28,678.95		31,574.90	6,000.00	6,508.83	12,508.83
Roswell	1,605	307,682.07	114,352.10	75,089.440		23,705.44	10,123.80	33,829.24		31.659.66	6,000.00	5,783.52	11,783.52
Santa Fe	1,889	239,163.92	105,679.75	648,003.380		24,999.43	5,474.24	30,473.67		32,612.75	6,000.00	8,083.99	14,083.99
Tucumcari	705	41,680.74	108,496.17	62,967.300		8,203.13	1,786.58	9,989.71		10,068.18	6,000.00	5,890.03	11,890.03
Indian and private land grants				4,403.410									
North Dakota:													
Bismarck	317	9,088.47	23,579.44	28,139.510	$447.96	2,900.83	2,235.84	5,584.63	$5,064.50	10,770.17	3,544.99	3,100.62	6,645.61
Dickinson	1,085	89,806.70	121,429.33	96,764.710		12,613.04	2,660.68	15,273.72		15,274.22	6,000.00	4,794.09	10,794.09
Minot	257	8,332.38	13,318.12	26,781.098	2,053.06	2,500.20	1,023.50	5,576.76	226,580.96	232,109.86	5,166.67	2,363.56	7,530.23
Williston	903	27,733.55	111,590.16	81,526.490		6,121.79	1,659.36	7,781.15		7,781.30	5,230.01	2,717.33	7,947.34
Indian and private land grants				1,753.610									
Ohio				1,060.200									
Oklahoma:													
Guthrie	779	32,037.69	50,562.11	41,108.884	200.81	4,944.26	16,318.68	21,463.75	119,353.64	140,806.70	4,559.26	3,144.38	7,703.64
Indian and private land grants				5,439.410									

Oregon:													
Burns	554	31,707.40	76,265.77	50,491.689		5,888.97	19,614.55	25,503.52		27,480.01	6,000.00	2,218.20	8,218.20
La Grande	788	41,383.98	74,802.07	52,534.380		7,159.26	17,718.15	24,877.41	1,777.93	26,450.71	6,000.00	3,998.50	9,998.50
Lakeview	706	38,181.94	97,547.13	67,864.030		7,537.76	24,439.74	31,977.50		31,759.72	6,000.00	1,958.78	7,968.78
Portland	226	8,020.26	18,237.99	14,620.862		2,444.50	54,610.31	57,054.81	24,081.30	81,240.20	3,684.88	2,779.96	6,464.84
Roseburg	515	26,069.33	23,415.95	22,894.626		5,930.02	117,030.23	122,960.25		125,945.21	4,479.08	4,934.77	9,413.85
The Dalles	1,112	63,892.90	122,184.64	108,928.419		11,161.84	19,887.69	31,049.53		31,586.16	6,000.00	3,219.90	9,219.90
Vale	489	41,610.65	46,442.04	26,764.370		4,973.82	8,929.19	13,903.01		14,810.60	4,900.98	1,676.97	6,577.95
Indian and private land grants				5,047.080									
South Dakota:													
Bellefourche	860	77,224.26	72,896.75	48,831.213		7,700.19	9,920.81	17,621.00		18,772.90	6,000.00	3,985.17	9,985.17
Gregory	15	630.46	1,323.54	21,641.989	3,120.20	834.46	440.52	4,395.18	55,378.13	59,773.81	4,661.92	2,123.11	6,785.03
Lemmon	634	31,914.36	63,959.98	113,201.020	2,646.52	4,763.09	5,307.84	12,717.45	156,427.59	167,394.14	6,000.00	4,065.28	10,065.28
Pierre	334	32,362.10	20,969.19	19,731.980		3,475.69	2,443.44	5,919.13		5,875.13	2,989.51	1,563.23	4,552.74
Rapid City	1,177	100,208.40	82,521.69	55,389.433		10,566.40	15,520.63	26,087.03		28,517.52	6,000.00	7,772.28	13,772.28
Timber Lake	1			109,821.604	6,127.65	732.22		6,859.87	354,017.89	358,634.65	6,000.00	3,907.53	9,907.53
Indian and private land grants				114,733.490									
Utah:													
Salt Lake City	1,795	213,365.81	140,718.62	119,434.821		23,647.74	212,210.00	235,857.74		307,758.88	6,000.00	8,268.12	14,268.12
Vernal	183	26,076.06	3,093.92	181,104.072	710.49	2,914.66	3,173.58	5,798.73	48,972.81	58,012.64	3,904.83	822.81	4,727.64
Indian and private land grants				1,283.050									
Washington:													
Seattle	165	22,127.47	8,588.56	58,270.819		1,624.24	12,719.67	14,343.91		14,397.91	2,659.44	2,366.92	5,026.36
Spokane	400	17,032.01	33,261.29	26,164.477	2,348.09	4,396.10	6,026.48	12,770.67	9,833.39	23,517.13	6,000.00	2,968.88	8,968.88
Vancouver	128	6,650.37	8,759.32	18,268.290		1,336.17	1,646.51	2,982.68		10,398.45	2,359.17	1,975.75	4,334.92
Walla Walla	322	21,201.95	25,613.50	19,774.510		3,905.05	2,524.51	6,429.56		9,491.78	3,885.96	807.10	4,693.06
Waterville	485	36,102.73	44,550.66	37,778.364	2,131.54	4,408.31	4,857.68	11,397.53	19,052.51	33,407.67	6,000.00	3,599.38	9,599.38
Yakima	193	42,246.77	13,675.99	46,999.620		3,092.13	2,399.13	5,491.26		8,422.62	3,673.30	1,479.18	5,152.48
Indian and private land grants				12,199.820									
Wisconsin, Wausau	177	3,613.57	7,346.48	5,570.660		1,225.59	964.83	2,190.42		2,124.60	1,932.02	21.21	1,953.23
Wyoming:													
Buffalo	991	154,903.92	52,274.34	35,064.417		14,017.03	12,972.67	26,989.70		27,554.31	6,000.00	5,159.88	11,159.88
Cheyenne	1,940	169,967.17	254,338.15	190,270.872		26,470.29	24,407.10	50,877.39		51,841.24	6,000.00	5,486.39	11,486.39
Douglas	2,001	411,220.81	82,664.79	70,400.165		33,519.83	18,000.81	51,520.64		52,930.63	6,000.00	4,974.03	10,974.03
Evanston	630	44,183.58	39,933.19	19,491.640		5,666.91	219,458.83	225,125.74		225,509.74	6,000.00	1,320.36	7,320.36
Lander	1,083	55,798.27	24,346.60	25,433.430	531.45	6,984.70	40,013.76	47,529.91	6,428.53	64,133.94	6,000.00	2,733.97	8,733.97
Sundance	1,758	326,774.76	106,347.49	68,813.730		27,355.34	22,795.10	50,150.44		50,499.08	6,000.00	5,200.54	11,200.54
Indian and private land grants				140.000									
Made at General Land Office	1		80.00				100.00	100.00					
Land offices discontinued				5,841.430									
Total	93,156	9,343,015.68	8,951,094.67	9,552,482.217	67,526.47	1,090,662.08	1,990,620.27	3,148,908.82	1,935,377.44	5,357,677.34	462,252.46	359,505.69	821,758.15

Entries made and expenses incurred at district land offices during fiscal year ended June 30, 1918.

States—Offices.	Total earnings in detail.								
	Fees and commissions.	Sales of public lands.	Total.	Sales of Government property.	Outstanding liabilities—Lands, act Mar. 2, 1907.	Sales of reclamation town sites.	Sales of lands in Oregon and California R. R. grant.	Sales of Indian lands.	Aggregate.
Alabama, Montgomery	$2,442.84	$8,589.07	$11,031.91						$11,031.91
Alaska:									
Fairbanks	145.90	30,962.00	31,107.90						31,107.90
Juneau	1,865.43	55,305.25	57,170.68						57,170.68
Nome	164.70	8,350.60	8,515.30						8,515.30
Total	2,176.03	94,617.85	96,793.88						96,793.88
Arizona, Phoenix	26,490.29	49,718.38	76,208.67					$357.75	76,566.42
Arkansas:									
Camden	2,559.97	7,212.29	9,772.26						9,772.26
Harrison	6,748.07	3,770.36	10,518.43						10,518.43
Little Rock	6,088.82	4,952.57	11,041.39		$116.50				11,157.89
Total	15,396.86	15,935.22	31,332.08		116.50				31,448.58
California:									
El Centro	2,098.49	25,364.87	27,463.36					5,182.26	32,645.62
Eureka	1,698.29	4,456.10	6,154.39					4,905.52	11,059.91
Independence	3,681.93	9,464.62	13,146.55						13,146.55
Los Angeles	12,707.14	29,199.98	41,907.12						41,907.12
Sacramento	8,107.35	16,924.33	25,031.68						25,031.68
San Francisco	7,140.47	15,257.41	22,397.88					30,808.94	53,206.82
Susanville	3,318.31	11,355.61	14,673.92						14,673.92
Visalia	6,547.70	15,406.45	21,954.15						21,954.15
Total	45,299.68	127,429.37	172,729.05					40,896.72	213,625.77
Colorado:									
Del Norte	1,871.63	4,693.21	6,564.84						6,564.84
Denver	16,876.32	40,548.07	57,424.39						57,424.39
Durango	8,845.79	15,831.24	24,677.03					7,949.97	32,627.00
Glenwood Springs	21,444.15	8,573.86	30,018.01					35,762.76	65,780.77
Hugo	5,792.72	2,688.94	8,481.66						8,481.66
Lamar	31,833.48	14,117.49	45,950.97						45,950.97
Leadville	2,478.28	4,174.15	6,652.43						6,652.43
Montrose	7,910.48	6,758.74	14,669.22		39.90			24,497.77	39,206.89
Pueblo	47,612.54	35,777.32	83,389.86						83,389.86
Sterling	20,874.51	18,129.33	39,003.84						39,003.84
Total	165,539.90	151,292.35	316,832.25		39.90			68,210.50	385,082.65
Florida, Gainesville	7,186.72	8,381.32	15,568.04						15,568.04

Idaho:									
Blackfoot	31,626.60	45,147.70	76,774.30					30.00	76,804.30
Boise	12,191.33	30,169.25	42,360.58						42,360.58
Coeur d'Alene	3,120.33	9,808.67	12,929.00		490.31			11,471.74	24,891.05
Hailey	19,752.29	37,905.04	57,657.33			$6,236.11			63,893.44
Lewiston	5,655.33	6,737.42	12,392.75						12,392.75
Total	72,345.88	129,768.08	202,113.96		490.31	6,236.11		11,501.74	220,342.12
Kansas:									
Dodge City	4,550.98	3,922.25	8,473.23					591.94	9,065.17
Topeka	1,504.90	1,113.22	2,618.12					478.53	3,096.65
Total	6,055.88	5,035.47	11,091.35					1,070.47	12,161.82
Louisiana, Baton Rouge	4,156.20	5,243.57	9,399.77		9.66				9,409.43
Michigan, Marquette	1,745.80	4,813.08	6,558.88		1.25				6,560.13
Minnesota:									
Cass Lake	11,068.83	910.20	11,979.03					110,256.87	122,235.90
Crookston	12,938.11	671.31	13,609.42					144,180.64	157,790.06
Duluth	2,363.84	4,873.38	7,237.22					2,710.18	9,947.40
Total	26,370.78	6,454.89	32,825.67					257,147.69	289,973.36
Mississippi, Jackson	3,032.02	10,570.92	13,602.94						13,602.94
Missouri, Springfield	240.95	2,051.44	2,292.39						2,292.39
Montana:									
Billings	18,316.76	6,005.54	24,322.30			3,762.17		98,387.12	126,471.59
Bozeman	17,502.78	14,081.05	31,583.83						31,583.83
Glasgow	83,545.56	55,452.56	138,998.12					315,981.45	454,979.57
Great Falls	30,840.57	41,360.97	72,201.54	$3.00	127.00	477.04			72,808.58
Havre	59,349.96	92,493.16	151,843.12		.33	156.38			151,999.83
Helena	27,125.21	59,999.58	87,124.79						87,124.79
Kalispell	3,581.17	1,406.82	4,987.99	170.00				54,635.79	59,793.78
Lewistown	44,487.89	150,137.62	194,625.51						194,625.51
Miles City	85,675.62	44,407.42	130,083.04		152.88				130,235.92
Missoula	5,504.92	8,919.85	14,424.77		90.50			60,229.03	74,744.30
Total	375,930.44	474,264.57	850,195.01	173.00	370.71	4,395.59		529,233.39	1,384,367.70
Nebraska:									
Alliance	3,861.02	14,784.91	18,645.93	117.20					18,763.13
Broken Bow	3,054.00	7,360.18	10,414.18		14.00				10,428.18
Lincoln	460.57	2,886.96	3,347.53						3,347.53
North Platte	1,890.96	1,876.91	3,767.87		4.00				3,771.87
O'Neill	619.72	1,030.00	1,649.72						1,649.72
Valentine	2,710.16	36,411.60	39,121.76						39,121.76
Total	12,596.43	64,350.56	76,946.99	117.20	18.00				77,082.19

Entries made and expenses incurred at district land offices during fiscal year ended June 30, 1918—Continued.

States—Offices.	Total earnings in detail.								
	Fees and commissions.	Sales of public lands.	Total.	Sales of Government property.	Outstanding liabilities—Lands, act Mar. 2, 1907.	Sales of reclamation town sites.	Sales of lands in Oregon and California R. R. grant.	Sales of Indian lands.	Aggregate.
Nevada:									
Carson City	$4,647.96	$21,673.06	$26,321.02						$26,321.02
Elko	3,693.19	8,687.17	12,380.36						12,380.36
Total	8,341.15	30,360.23	38,701.38						38,701.38
New Mexico:									
Clayton	17,760.45	7,940.37	25,700.82						25,700.82
Fort Sumner	13,345.09	3,231.10	16,576.19		$70.50				16,646.69
Las Cruces	13,029.67	18,545.23	31,574.90						31,574.90
Roswell	24,395.26	7,264.40	31,659.66						31,659.66
Santa Fe	25,195.26	7,417.49	32,612.75						32,612.75
Tucumcari	8,281.60	1,786.58	10,068.18						10,068.18
Total	102,007.33	46,185.17	148,192.50		70.50				148,263.00
North Dakota:									
Bismarck	3,379.83	2,335.84	5,715.67					$5,054.50	10,770.17
Dickinson	12,613.54	2,660.68	15,274.22						15,274.22
Minot	4,565.90	1,023.00	5,588.90					226,580.96	232,169.86
Williston	6,121.94	1,659.36	7,781.30						7,781.30
Total	26,681.21	7,678.88	34,360.09					231,635.46	265,995.55
Oklahoma, Guthrie	5,213.83	15,999.23	21,213.06					119,353.64	140,566.70
Oregon:									
Burns	5,908.57	21,571.44	27,480.01						27,480.01
La Grande	7,152.33	17,520.45	24,672.78					1,777.93	26,450.71
Lakeview	7,633.96	24,125.76	31,759.72						31,759.72
Portland	2,548.59	4,228.93	6,777.52				$50,381.38	24,081.30	81,240.20
Roseburg	5,886.86	9,174.11	15,060.97	$96.85			110,788.39		125,946.21
The Dalles	11,182.24	20,403.92	31,586.16						31,586.16
Vale	5,141.41	9,669.19	14,810.60						14,810.60
Total	45,453.96	106,693.80	152,147.76	96.85			161,169.77	25,859.23	339,273.61

South Dakota:									
Bellefourche	7,829.64	4,411.31	12,240.95			$6,531.95			18,772.90
Gregory	3,955.16	440.52	4,396.68					55,378.13	59,773.81
Lemmon	7,296.96	3,669.59	10,966.55					156,427.59	167,394.14
Pierre	3,481.69	2,393.44	5,875.13						5,875.13
Rapid City	10,611.25	17,906.27	28,517.52						28,517.52
Timber Lake	4,431.76		4,431.76	177.00	8.00			354,017.89	358,634.65
Total	37,606.46	28,821.13	66,427.59	177.00	8.00	6,531.95		565,823.61	638,968.15
Utah:									
Salt Lake City	24,352.35	283,406.53	307,758.88						307,758.88
Vernal	3,565.26	5,474.57	9,039.83					48,972.81	58,012.64
Total	27,917.61	288,881.10	316,798.71					48,972.81	365,771.52
Washington:									
Seattle	1,659.74	12,734.67	14,394.41	3.50					14,397.91
Spokane	6,793.93	6,889.81	13,683.74					9,833.39	23,517.13
Vancouver	1,400.61	8,929.79	10,330.40	68.05					10,398.45
Walla Walla	4,006.25	5,485.53	9,491.78						9,491.78
Waterville	6,528.39	7,826.77	14,355.16					19,052.51	33,407.67
Yakima	3,300.92	5,121.70	8,422.62						8,422.62
Total	23,669.84	46,988.27	70,678.11	71.55				28,885.90	99,635.56
Wisconsin, Wausau	1,259.77	864.83	2,124.60						2,124.60
Wyoming:									
Buffalo	14,158.64	13,395.67	27,554.31						27,554.31
Cheyenne	26,464.49	25,376.75	51,841.24						51,841.24
Douglas	33,530.08	19,400.55	52,930.63						52,930.63
Evanston	5,839.42	219,670.32	225,509.74						225,509.74
Lander	7,617.55	18,564.10	26,181.65			31,523.76		6,428.53	64,133.94
Sundance	27,562.84	22,936.24	50,499.08						50,499.08
Total	115,173.02	319,343.63	434,516.65			31,523.76		6,428.53	472,468.94
Aggregate all States	1,160,350.88	2,050,332.41	3,210,683.29	634.60	1,124.83	48,687.41	161,169.77	1,935,377.44	5,357,677.34
General Land Office:									
Sales of public lands		243.17	243.17						243.17
Depredations, public									22,543.40
Power permits									13,670.10
Sales of fire-killed timber, public									5,022.57
Coal leases									965.00
Timber, Ute Indian lands								395.04	395.04
Maps, Indian								1.25	1.25
Copies of records									25,436.59
Outstanding liabilities					199.43				199.43
Offices of surveyors general, copies of records									5,673.77
Aggregate	1,160,350.88	2,050,575.58	3,210,926.46	634.60	1,324.26	48,687.41	161,169.77	1,935,773.73	5,431,827.66

NOTE.—"Total earnings" are receipts credited to United States.

RECAPITULATION BY STATES.

Location.	Number of applications, entries, etc., original and final.	Area.			Receipts for allowed applications and entries.				Indian.	Total earnings.	Expenses.		
		Entered.		Patented.	Fees and commissions.		Purchase money.	Total.			Salaries and commissions, registers and receivers.	Incidental.	Total.
		Original.	Final.		Indian lands.	Public lands.							
		Acres.	*Acres.*	*Acres.*									
Alabama	369	9,310.44	16,688.71	17,416.330	....	$2,423.34	$8,841.12	$11,264.46	....	$11,031.91	$2,813.10	$1,447.47	$4,260.57
Alaska	464	12,977.93	5,656.47	5,441.760	....	2,188.12	26,439.48	28,627.60	....	96,793.88	5,982.05	5,127.31	11,109.36
Arizona	4,125	1,236,786.93	163,859.33	215,876.389	....	27,514.39	47,976.01	75,490.40	$357.75	76,566.42	5,716.67	8,907.32	14,623.99
Arkansas	2,285	97,476.05	96,964.00	111,086.790	....	15,297.79	15,537.17	30,834.96	....	31,448.58	11,050.13	8,289.70	19,339.83
California	4,417	286,526.11	290,907.92	312,004.315	$75.76	45,059.76	114,408.57	159,544.09	40,896.72	213,625.77	35,434.73	24,904.36	60,339.09
Colorado	11,209	1,142,194.65	1,199,560.26	917,100.212	12,974.04	151,474.39	125,796.74	290,245.17	68,210.50	385,082.65	52,617.37	38,978.97	91,596.34
Florida	1,006	36,319.10	63,315.17	51,055.630	....	7,178.21	8,371.57	15,549.78	....	15,568.04	5,497.88	5,262.66	10,760.54
Idaho	7,015	554,082.58	638,844.78	360,223.008	623.24	71,257.84	118,185.52	190,066.60	11,501.74	220,342.12	27,491.20	22,151.23	49,642.43
Illinois	....	....	....	240.000	....	....	....	....	....	....	....	....	....
Iowa	....	....	....	120.000	....	....	....	....	....	....	....	....	....
Kansas	601	45,947.76	44,257.92	39,221.930	....	5,997.88	4,633.77	10,631.65	1,070.47	12,161.82	5,717.38	3,533.07	9,250.45
Louisiana	398	13,714.36	16,942.27	15,344.440	....	4,050.96	5,525.57	9,576.53	....	9,409.43	4,025.62	4,342.57	8,368.19
Michigan	214	6,913.21	9,088.11	6,146.990	....	1,729.01	5,096.98	6,825.99	....	6,560.13	2,287.80	17.58	2,305.38
Minnesota	576	14,529.25	30,186.15	241,516.430	21,216.27	5,139.28	6,190.38	32,545.93	257,147.69	289,973.36	14,640.82	7,801.23	22,442.05
Mississippi	413	10,443.24	17,438.22	20,507.890	....	3,010.29	10,669.73	13,680.02	....	13,602.94	3,343.20	2,310.80	5,654.00
Missouri	58	320.00	3,454.34	3,048.276	....	186.55	1,831.01	2,017.56	....	2,292.39	396.88	1,076.92	1,473.80
Montana	26,679	2,440,626.08	3,356,592.27	3,564,000.079	12,319.40	363,206.53	456,072.40	831,598.33	529,233.39	1,384,367.70	57,923.52	66,649.90	124,573.42
Nebraska	1,592	66,203.38	435,200.47	490,424.220	....	12,551.70	52,300.62	64,852.32	....	77,082.19	16,679.55	9,655.96	26,335.51
Nevada	965	124,540.78	57,484.44	48,749.629	....	9,430.83	35,291.12	44,721.95	....	38,701.38	9,002.54	4,406.22	13,408.76
New Mexico	7,765	1,033,681.76	638,025.04	1,081,035.095	....	100,152.78	44,420.69	144,573.47	....	148,263.00	36,000.00	37,124.24	73,124.24
North Dakota	2,562	134,963.10	269,917.06	235,204.418	2,501.01	24,135.86	7,579.38	34,216.25	231,635.46	265,995.55	19,941.67	12,975.60	32,917.27
Ohio	....	....	....	1,060.200	....	....	....	....	....	....	....	....	....
Oklahoma	779	32,037.69	50,562.11	46,704.244	200.81	4,944.26	16,318.68	21,463.75	119,353.64	140,506.70	4,559.26	3,144.38	7,703.64
Oregon	4,392	250,866.46	458,885.59	349,145.456	....	45,096.17	262,229.86	307,326.03	25,850.23	339,272.61	37,064.94	20,797.08	57,862.02
South Dakota	3,021	242,339.57	241,671.15	483,355.729	11,894.37	28,072.05	33,633.24	73,599.66	565,823.61	638,968.18	31,651.43	23,416.60	55,068.03
Utah	1,978	239,441.87	143,812.54	301,821.943	710.49	26,562.40	214,383.58	241,656.47	48,972.81	365,771.82	9,904.83	9,090.93	18,995.76
Washington	1,693	145,361.30	134,449.32	219,455.900	4,479.63	18,762.00	30,173.98	53,415.61	28,885.90	99,636.56	24,577.87	13,197.21	37,775.08
Wisconsin	177	3,613.57	7,346.48	5,570.660	....	1,225.59	964.83	2,190.42	....	2,124.60	1,932.02	21.21	1,953.23
Wyoming	8,403	1,162,848.51	559,904.56	409,614.254	531.45	114,014.10	337,648.27	452,193.82	6,428.53	472,468.94	36,000.00	24,875.17	60,875.17
Made at General Land Office	1	....	80.00	....	....	....	100.00	100.00	....	....	....	....	....
Total	93,156	9,343,015.66	8,951,004.67	9,552,492.217	67,526.47	1,090,662.08	1,990,620.27	3,148,808.82	1,935,377.44	5,257,677.34	462,252.46	359,505.69	821,758.15

General Land Office:													
Sales of public land	......	......	......	......	......	......	......	......	......	243.17	......	......	......
Depredations, public	......	......	......	......	......	......	......	......	......	22,543.40	......	......	......
Power permits	......	......	......	......	......	......	......	......	......	13,670.10	......	......	......
Sales of fire-killed timber, public	......	......	......	......	......	......	......	......	......	5,022.57	......	......	......
Coal leases	......	......	......	......	......	......	......	......	......	965.00	......	......	......
Timber, Ute Indian lands	......	......	......	......	......	......	......	......	395.04	395.04	......	......	......
Maps, Indian	......	......	......	......	......	......	......	......	1.25	1.25	......	......	......
Copies of records	......	......	......	......	......	......	......	......	......	25,436.59	......	......	......
Outstanding liabilities	......	......	......	......	......	......	......	......	......	199.43	......	......	......
Offices of surveyors general:													
Copies of records	......	......	......	......	......	......	......	......	......	5,673.77	......	......	......
Aggregate	93,156	9,343,015.68	8,951,094.67	9,552,482.217	67,526.47	1,090,662.08	1,990,620.27	3,148,808.82	1,935,773.73	5,431,827.66	462,252.46	359,505.69	821,758.15

RECAPITULATION BY CLASSES OF ENTRIES.

State or Territory.	At public auction.			Subject to preemption entry.			Timber and stone.			Mineral.			Coal.		
	Entries.	Acres.	Amount.	Entries.	Acres.	Amount.	Entries.	Acres.	Amount.	Entries.	Acres.	Amount.	Entries.	Acres.	Amount.
Alabama							34	2,066.10	7,230.34						
Alaska										37	2,459.68	7,502.50			
Arizona	10	1,159.96	2,239.96							75	3,682.61	18,740.00			
Arkansas	13	589.87	1,438.97				24	2,191.98	7,966.73	3	190.00	475.00			
California	124	7,753.30	16,437.39				80	7,759.17	22,684.15	81	5,779.81	17,057.50			
Colorado	142	10,273.56	24,347.16				64	8,644.77	25,763.25	104	1,940.23	9,630.00	3	200.00	13,600.00
Florida	3	104.05	385.00				1	27.30	75.95						
Idaho	93	6,667.28	24,815.26				51	6,640.08	23,363.65	28	1,176.58	5,147.50			
Kansas	13	645.18	2,094.78												
Louisiana	2	140.08	905.00				3	323.75	1,588.78						
Michigan	1	1.77	18.34				16	1,133.00	4,003.50						
Minnesota	3	120.00	280.00				20	1,257.37	3,474.45						
Mississippi	1	46.74	98.15				29	2,321.29	8,217.68						
Montana	644	43,206.09	134,129.00	1	40.00	100.00	64	6,062.82	20,441.14	124	4,150.78	18,216.19	36	3,799.87	121,718.89
Nebraska	148	10,030.27	38,449.19												
Nevada	2	240.00	300.00							26	3,936.66	13,635.00			
New Mexico	106	6,877.34	12,904.01							71	2,118.28	10,870.00	3	240.00	4,400.00
North Dakota	15	581.29	2,684.26										4	160.00	3,600.00
Oklahoma	164	16,744.90	1,490.28							1	160.00	400.00			
Oregon	178	14,720.40	38,774.03				70	8,506.12	26,058.61	10	6,327.96	17,280.50	1	320.00	6,400.00
South Dakota	91	4,357.96	11,324.94				3	302.67	821.29	4	271.80	1,371.46	1	160.00	1,600.00
Utah	29	2,090.53	5,673.02							30	1,465.16	7,510.00	24	5,416.17	188,814.55
Washington	20	1,210.39	3,544.66				36	4,361.50	14,387.25	19	996.51	4,140.00			
Wisconsin	1	40.00	100.00				3	120.00	360.00						
Wyoming	196	16,974.74	37,764.64				52	7,124.93	18,253.75	5	340.62	1,101.33	13	1,275.98	209,704.60
Total	2,001	144,595.70	360,296.01	1	40.00	100.00	550	58,842.80	184,699.52	618	34,996.67	133,066.97	85	11,572.02	549,838.04

State.	Disposition of abandoned military reservations.										Excess-area payments.		
	Sale.			Homestead law.									
				Original.			Final.						
	No.	Acres.	Amount.	No.	Acres.	Fees and commissions.	No.	Acres.	Fees and commissions.	Purchase money.	No.	Acres.	Amount.
Alabama											2	1.18	$1.48
Arizona							3	258.72	$11.82	$331.40	36	195.81	370.74
Arkansas											30	171.35	213.15
California	7	1.99	$170.63								182	1,002.16	1,486.26
Colorado											514	2,607.44	3,486.04
Florida							2	120.00		150.00	18	64.87	77.17
Idaho											139	890.94	1,156.72
Kansas											7	10.04	22.97
Louisiana											13	106.26	137.16
Michigan													
Minnesota											3	8.12	10.18
Mississippi											9	5.43	6.85
Montana				202	32,757.27	$3,120.17	7	882.97	32.90	683.65	667	4,497.38	6,410.10
Nebraska				1	160.00	14.00	47	7,280.80	182.00	9,641.84	6	15.08	21.83
Nevada											51	659.21	891.77
New Mexico											214	993.78	1,253.93
North Dakota											22	101.87	164.33
Oregon											93	516.20	711.29
South Dakota				3	280.00	27.00	1	160.00		200.00	51	200.70	243.71
Utah				3	320.00	43.10	2	155.09	6.00	308.73	63	331.82	430.57
Washington											29	94.66	205.49
Wisconsin											1	21.93	54.83
Wyoming	8	1,129.92	1,412.40				1	156.55	11.74	60.08	401	1,933.12	2,461.53
Total	15	1,131.91	1,583.03	209	33,517.27	3,204.27	63	9,014.13	244.46	11,375.70	2,551	14,429.29	19,817.60

RECAPITULATION BY CLASSES OF ENTRIES—Continued.

State.	Desert land entries.																	
	Number.		Acres.		Amount.		Desert land relief, act of Mar. 4, 1915.											
							Elections to purchase.			Final.			Commuted.			Proof in the manner required of a homestead entryman.	
	Original.	Final.	Original.	Final.	Original.	Final.	No.	Acres.	Amount.	No.	Acres.	Amount.	No.	Acres.	Amount.	No.	Acres.
Arizona	177	34	31,250.78	5,409.60	$7,813.48	$5,412.55	58	10,596.26	$5,298.13	31	5,981.01	$4,488.04	....	....	....	16	3,428.12
California	167	114	23,445.78	15,641.66	5,860.91	15,656.99	122	26,720.78	13,360.39	21	4,028.54	3,021.42	....	....	....	5	1,039.12
Colorado	60	76	8,937.87	11,793.10	2,275.49	11,798.44	276	53,219.26	26,609.63	133	25,301.35	18,979.01	3	468.12	$585.15	9	2,130.24
Idaho	193	164	25,798.00	20,606.78	6,457.39	20,610.35	94	15,224.88	7,612.44	25	3,982.85	2,987.11	2	320.00	400.00	5	1,004.24
Montana	75	226	11,446.34	42,598.71	2,868.17	42,621.38	358	58,320.48	29,160.24	349	56,946.60	44,224.19	....	....	....	26	4,998.25
Nevada	107	61	19,164.14	10,356.05	4,792.70	10,355.70	6	1,161.20	580.60	3	960.00	720.00	....	....	....	3	724.30
New Mexico	19	12	2,807.32	1,955.11	701.80	1,956.21	50	8,665.50	4,332.75	17	3,360.00	2,520.00	....	....	....	10	1,850.27
North Dakota	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Oregon	74	46	10,506.46	6,600.92	2,629.94	6,601.13	43	6,512.96	3,256.48	13	2,491.81	1,868.85	....	....	....	3	640.00
South Dakota	3	3	320.00	400.00	80.00	400.00	45	6,322.28	3,161.14	52	8,760.82	6,570.32	1	40.00	50.00	6	1,067.62
Utah	48	62	6,603.39	7,282.33	1,651.03	7,290.33	84	6,328.02	3,164.01	14	2,501.01	1,875.75	....	....	....	....	....
Washington	21	21	1,697.82	1,742.71	424.30	1,742.50	110	13,734.58	6,867.29	6	544.88	408.66	....	....	....	8	1,105.42
Wyoming	126	148	20,329.28	22,616.19	5,092.84	22,643.97	77	12,621.40	6,310.70	73	12,269.28	9,190.49	1	160.00	200.00	6	1,236.35
Total	1,070	967	162,309.18	147,003.16	40,648.05	147,089.55	1,273	219,427.60	109,713.80	737	129,127.65	96,853.84	7	988.12	1,235.15	97	19,243.93

State.	Homestead entries.									State selections.			Railroad selections.		
	Entries			Acres			Amount.								
	Original.	Final.	Commuted.	Original.	Final.	Commuted.	Original.	Final.	Commuted.	No.	Acres.	Amount.	No.	Acres.	Amount.
Alabama	126	178	17	9,310.44	13,342.29	1,280.32	$1,018.60	$338.65	$1,600.30						
Alaska	84	43	1	12,337.93	2,999.43	80.00	1,217.67	275.84	100.00						
Arizona	806	856	43	116,637.63	137,427.59	5,567.66	11,897.36	5,631.91	7,006.92	1,884	1,084,185.13	$6,951.00	3	4,713.39	$62.00
Arkansas	1,142	1,000	53	97,476.06	89,629.52	4,362.63	10,066.23	2,258.55	5,443.82						
California	1,588	1,706	110	249,704.11	233,475.10	14,226.40	25,845.73	11,486.00	21,212.34	6	840.88	16.00	10	11,515.34	156.00
Colorado	4,834	4,775	90	1,182,276.51	1,127,359.99	10,808.90	89,760.58	46,356.72	14,172.10	3	860.27	14.00	2	120.00	4.00
Florida	407	497	66	86,172.51	56,897.73	6,104.35	3,760.16	1,422.07	7,574.10	4	146.59	8.00			
Idaho	2,473	3,556	118	467,169.14	582,706.37	15,513.87	40,060.13	22,370.15	18,720.99	15	7,414.38	100.00	11	53,411.06	678.00
Kansas	289	271	13	45,947.76	41,599.93	1,852.81	4,012.87	1,339.08	2,316.02						
Louisiana	197	133	26	12,862.46	9,891.30	1,369.28	1,453.94	333.70	2,768.89	4	851.90				
Michigan	78	79	8	6,913.21	7,091.36	861.98	712.58	197.53	1,075.14						
Minnesota	191	315	20	14,520.00	27,348.35	1,460.43	1,645.24	804.87	2,225.75				1	9.25	2.00
Mississippi	146	170	18	10,143.24	12,286.73	1,502.77	1,167.13	307.34	2,248.74						
Missouri	5	29	1	320.00	1,989.69	80.00	33.00	56.70	100.00						
Montana	9,429	13,933	245	2,124,092.07	3,158,572.02	33,133.84	178,717.60	145,258.76	43,195.61	22	8,601.53	122.00	57	260,492.24	3,318.00
Nebraska	347	1,015	28	66,043.38	414,694.81	3,194.59	4,486.18	3,931.89	4,187.76						
Nevada	291	295	13	48,379.12	39,416.26	1,811.17	4,760.52	2,455.35	2,463.95				6	56,997.52	722.00
New Mexico	3,834	2,950	57	883,620.61	612,931.90	7,683.95	69,905.13	23,439.37	9,571.24	299	144,969.82	968.00	16	2,264.01	50.00
North Dakota	804	1,698	9	134,883.10	268,495.44	600.82	11,352.55	8,963.49	730.80	2	80.00	4.00			
Oklahoma	322	190	91	31,308.93	22,797.47	10,859.74	3,155.06	569.19	13,596.95						
Oregon	1,321	2,881	42	238,039.69	413,356.63	5,758.13	21,461.88	16,224.29	7,281.39	2	178.70	4.00	22	2,139.61	54.00
South Dakota	1,196	1,499	53	241,725.47	218,647.18	7,478.60	16,972.44	5,479.20	4,810.28				1	14.10	2.00
Utah	969	560	5	224,129.69	124,237.38	624.87	17,714.69	5,102.62	779.60	18	8,388.79	116.00			
Washington	524	868	33	71,278.01	120,689.65	3,399.10	8,109.64	6,098.42	4,721.12				21	72,225.47	926.00
Wisconsin	61	92	4	3,288.12	6,866.48	200.00	470.05	278.38	350.00				1	125.45	2.00
Wyoming	4,411	2,235	29	1,140,749.40	491,687.58	4,298.70	86,884.46	20,208.26	5,371.08	4	360.00	8.00	1	29.19	2.00
Commissions on Indian lands							38,486.23	22,250.01							
Total	35,875	41,319	1,193	7,419,628.58	8,236,438.18	144,414.40	655,127.64	353,442.34	183,623.39	2,263	1,256,897.99	8,311.00	152	464,056.63	5,978.00

RECAPITULATION, BY CLASSES, OF ENTRIES—Continued.

State.	Applications.						Mineral adverse claims.		Filings.								Fees.		Miscellaneous entries, applications, sales, etc.		
	Coal lands.		Timber and stone lands.		Mineral lands.				Preemption.		Homesteads.		Coal land.		Reservoir.		Cancellations.	Received for reducing testimony to writing, etc.			
	No.	Fees.	No.	Fees.	No.	Fees.	No.	Fees.	No.	Fees.	No.	Fees.	No.	Fees.	No.	Fees.			No.	Acres.	Amount.
Alabama			12	$120													4	$947.00			
Alaska					24	$240	3	$30									1	423.61	272	757.36	$18,836.98
Arizona			1	10	79	790	7	70			1	$3	15	$45	7	$21	104	1,902.39	41	944.07	1,588.98
Arkansas			17	130	3	30											47	2,766.01			
California			76	530	73	730	2	20			3	9	2	6			160	6,099.03	60	1,222.83	10,822.98
Colorado	18	$180	77	640	113	1,130	7	70	130	$390	10	30	39	117	2	6	456	12,320.09	1	640.00	1,160.10
Florida			3	20													28	1,937.98	4	61.74	111.35
Idaho			51	360	29	290	2	20			3	9	2	6	1	3	104	7,102.41	54	446.78	14,081.71
Kansas									4	8	3	6					47	584.93	1	160.00	200.00
Louisiana			9	80													13	2,170.32	11	5,217.86	126.74
Michigan			32	220													4	597.90			
Minnesota			22	190							1	2					125	2,370.17			100.00
Mississippi			34	230													12	1,293.82	6	980.69	98.81
Missouri																	1	96.85	23	1,384.65	1,731.01
Montana	42	420	30	250	119	1,190	5	50	1	3	9	27	71	213	6	18	543	29,878.46	289	3,436.95	21,508.72
Nebraska																	41	3,892.85			3.78
Nevada	2	20	2	10	27	270	6	60					39	117	8	24	15	975.96	23	40.00	2,133.00
New Mexico	7	70			44	440	1	10			2	6	18	54	37	111	201	4,865.78	48	1,008.19	276.00
North Dakota	6	60											6	12			85	3,658.82	1	80.00	400.00
Oklahoma																	57	1,038.28	11	728.76	956.19
Oregon	1	10	97	660	12	120					8	24					101	6,199.06	18	168.63	154,882.06
South Dakota	1	10	7	40	7	70					1	2					337	5,132.41	37	5.00	6,161.28
Utah	55	550	1	10	31	310	4	40					59	177			47	2,445.99	1	40.00	50.00
Washington	11	110	42	330	13	130	3	30			3	9	4	12			55	2,961.94	11	559.16	600.00
Wisconsin			8	80							1	2					9	384.16	5	320.00	100.00
Wyoming	28	280	134	1,110	1	10					14	42	93	279	1	3	182	4,977.64	430	2,014.36	24,407.56
Made at General Land Office																			1	80.00	100.00
Commissions on Indian lands																					6,781.23
Total	171	1,710	655	5,020	575	5,750	40	400	135	401	59	171	348	1,038	62	186	2,776	107,012.86	1,348	20,292.08	267,817.40

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[1] Fees with timber and stone applications are not earned until proof and payment under circular 576 of Nov. 27, 1917, although application is counted as allowed when noted in local land office and forwarded to chief of field division for appraisal.

VACANT PUBLIC LANDS ON JULY 1, 1918.

Statement showing the area of land unappropriated and unreserved on July 1, 1918.

[Counties containing no unappropriated lands are omitted.]

ALABAMA.

Land district and county.	Area in acres.			Character.
	Surveyed.	Unsurveyed.	Total.	
Montgomery:				
Autauga	80		80	Level, sandy, some marshy.
Baldwin	2,540		2,540	Rolling farm lands.
Barbour	160		160	Pine, rolling.
Butler	40		40	Broken, hilly, rolling.
Calhoun	200		200	Broken, hilly.
Cherokee	2,200		2,200	Pine, rolling.
Chilton	160		160	Do.
Choctaw	1,000		1,000	Broken, hilly, pine.
Clark	400		400	Broken, hilly.
Clay	2,080		2,080	Do.
Cleburne	2,240		2,240	Do.
Colbert	80		80	Broken, sandy.
Conecuh	280		280	Do.
Coosa	280		280	Do.
Covington	280		280	Do.
Crenshaw	80		80	Do.
Dale	440		440	Do.
De Kalb	240		240	Broken, rolling.
Escambia	200		200	Broken, hilly, sandy.
Etowah	400		400	Broken, rolling.
Fayette	200		200	Broken, hilly.
Franklin	720		720	Do.
Geneva	80		80	Broken, pine.
Green	80		80	Do.
Houston	240		240	Broken, sandy.
Jackson	4,000		4,000	Broken, hilly.
Lamar	560		560	Do.
Lauderdale	2,000		2,000	Do.
Madison	5,880		5,880	Mountainous, broken.
Marion	1,880		1,880	Broken, hilly.
Marshall	720		720	Broken, hilly, rolling.
Mobile	200		200	Broken, sandy.
Monroe	200		200	Do.
Morgan	960		960	Broken, hilly.
Perry	40		40	Pine, rolling.
Pickens	260		260	Broken, hilly, rolling.
Pike	200		200	Pine, level, sandy.
St. Clair	240		240	Hilly, broken, rolling.
Shelby	160		160	Broken, rolling.
Sumter	80		80	Pine, hilly, broken.
Talladega	1,000		1,000	Do.
Tuscaloosa	1,460		1,460	Do.
Washington	680		680	Do.
State total	35,220		35,220	

ARIZONA.

Land district and county.	Surveyed.	Unsurveyed.	Total.	Character.
Phoenix:				
Apache	594,100		594,100	Mountainous, arid, timber.
Cochise	454,300	406,900	861,200	Mountainous, grazing.
Coconino	119,600	395,280	514,880	Mountainous, grazing, timber.
Gila	40,800	100,000	140,800	Arid, broken.
Graham	330,500	631,000	961,500	Mountainous, grazing, broken.
Greenlee	100,400	263,000	363,400	Do.
Maricopa	760,300	2,276,400	3,036,700	Arid, grazing, broken.
Mohave	1,410,400	2,789,100	4,199,500	Do.
Navajo	338,000	133,750	471,750	Do.
Pima	670,800	1,373,000	2,043,800	Mountainous, arid, grazing.
Pinal	727,000	887,400	1,614,400	Arid, grazing.
Santa Cruz	60,400	46,080	106,480	Mountainous, arid, grazing.
Yavapai	522,800	1,312,000	1,834,800	Mountainous, grazing, broken.
Yuma	700,400	3,812,300	4,512,700	Arid, grazing, broken.
State total	6,829,800	14,426,210	21,256,010	

Statement showing the area of land unappropriated and unreserved on July 1, 1918—Con.

ARKANSAS.

Land district and county.	Area in acres.			Character.
	Surveyed.	Unsurveyed.	Total.	
Camden:				
Ashley	43		43	Rolling, thin soil.
Bradley	47		47	Swampy.
Calhoun	231		231	Do.
Clark	80		80	Broken.
Cleveland	54		54	River and creek bottom land.
Columbia	29		29	Rolling.
Drew	42		42	Gently rolling.
Garland	6,756		6,756	Mountainous.
Hempstead	2		2	River land.
Hot Springs	1,919		1,919	Mountainous.
Howard	2,276		2,276	Do.
La Fayette	44		44	Low, wet land.
Little River	122		122	Do.
Miller	136		136	Do.
Montgomery	13,288		13,288	Hilly or mountainous.
Nevada	80		80	Creek bottom land.
Ouachita	5	40	45	River land.
Pike	3,114		3,114	Mountainous.
Polk	9,572		9,572	Do.
Saline	285		285	Do.
Sevier	546		546	Do.
Union	53		53	Swampy.
Total	38,724	40	38,764	
Harrison:				
Baxter	16,640		16,640	Mountainous, timbered, mineral.
Benton	831		831	Mountainous, timbered.
Boone	2,952		2,952	Mountainous, timbered, mineral.
Carroll	1,626		1,626	Mountainous, timbered.
Crawford	700		700	Do.
Franklin	1,089		1,089	Do.
Fulton	10,280		10,280	Do.
Independence	980		980	Do.
Izard	12,529		12,529	Do.
Johnson	520		520	Do.
Madison	5,089		5,089	Do.
Marion	9,399		9,399	Mountainous, timbered, mineral.
Newton	11,463		11,463	Do.
Searcy	10,762		10,762	Mountainous, timbered.
Stone	19,521		19,521	Do.
Van Buren	760		760	Do.
Washington	6,482		6,482	Do.
Total	111,623		111,623	
Little Rock:				
Arkansas	5		5	Level.
Cleburne	10,364		10,364	Mountainous, timbered.
Cleveland	35		35	Broken, timbered.
Conway	1,620		1,620	Mountainous, timbered.
Crawford	4,240		4,240	Do.
Desha	40		40	Swampy, timbered.
Faulkner	880		880	Broken, timbered.
Franklin	3,865		3,865	Broken, mountainous, timbered.
Fulton	3,040		3,040	Broken, timbered.
Garland	2,860		2,860	Broken, mountainous, timbered.
Grant	40		40	Broken, timbered.
Hot Springs	40		40	Do.
Independence	3,101		3,101	Do.
Izard	3,600		3,600	Do.
Jackson	240		240	Do.
Johnson	13,940		13,940	Broken, mountainous, timbered.
Lawrence	460		460	Broken, timbered.
Logan	6,600		6,600	Do.
Lonoke	160		160	Do.
Mississippi	141	7,000	7,141	Do.
Montgomery	140		140	Do.
Perry	720		720	Do.
Phillips	40		40	Do.
Pope	6,207		6,207	Do.
Pulaski	80		80	Do.
Randolph	4,240		4,240	Do.
Saline	1,140		1,140	Broken, mountainous, timbered.
Scott	17,940		17,940	Do.
Sebastian	2,160		2,160	Do.

Statement showing the area of land unappropriated and unreserved on July 1, 1918—**Con.**

ARKANSAS—Continued.

Land district and county.	Area in acres.			Character.
	Surveyed.	Unsurveyed.	Total.	
Little Rock—Continued.				
Sharp	6,280		6,280	Broken, mountainous, timbered.
Van Buren	35,851		35,851	Broken, timbered.
White	320		320	Do.
Yell	2,600		2,600	Do.
Total	132,989	7,000	139,989	
State total	281,436	7,040	288,476	

CALIFORNIA.

Land district and county.	Surveyed.	Unsurveyed.	Total.	Character.
El Centro:				
Imperial	979,414	526,626	1,506,040	Mountainous, rolling, level, desert.
Riverside	984,317	827,397	1,811,714	Do.
San Diego	351,307	60,680	411,987	Do.
Total	2,315,038	1,414,703	3,729,741	
Eureka:				
Del Norte	721		721	Sea beach, mountainous.
Humboldt	63,860	16,851	80,711	Mountainous, timber, grazing.
Mendocino	5,460		5,460	Mountainous, grazing.
Siskiyou	970		970	Forest listings, grazing, farming.
Trinity	24,120		24,120	Mountainous, grazing, farming.
Total	95,131	16,851	111,982	
Independence:				
Alpine	10,581		10,581	Mountainous, grazing, mineral.
Inyo	2,685,270	1,166,878	3,852,148	Mountainous, agricultural, desert.
Kern	616,117	119,000	735,117	Grazing, mineral, desert, agricultural.
Mono	278,387	29,284	307,671	Mountainous, grazing, agricultural.
San Bernardino	2,098,175	1,213,515	3,311,690	Mountainous, mineral, desert.
Tulare	59,915		59,915	Mountainous, grazing.
Total	5,748,445	2,528,677	8,277,122	
Los Angeles:				
Kern	35,179	5,393	40,572	Arid, level desert, mountainous.
Los Angeles	500,451	5,916	506,367	Do.
Orange	19,726	1,624	21,350	Mountainous, hilly.
Riverside	196,330	45,599	241,929	Mountainous, rolling, level desert.
San Bernardino	3,253,172	370,949	3,624,121	Do.
San Diego	97,593	2,240	99,833	Do.
Santa Barbara	1,180		1,180	Mountainous, rolling.
Ventura	37,890	9,410	47,300	Do.
Total	4,141,521	441,131	4,582,652	
Sacramento:				
Alpine	12,435	300	12,735	Mountainous.
Amador	12,491		12,491	Hilly, grazing, mineral.
Butte	21,405	320	21,725	Do.
Calaveras	44,783		44,783	Do.
Colusa	25,553	1,880	27,433	Do.
El Dorado	33,445		33,445	Do.
Fresno	8,083	1,380	9,463	Do.
Glenn	12,272		12,272	Do.
Lake	11,147		11,147	Mountainous.
Madera	8,483	1,400	9,883	Hilly, grazing, farming, mineral.
Mariposa	48,354		48,354	Do.
Merced	1,586		1,586	Do.
Modoc	25,804	4,360	30,164	Mountainous, grazing, timber.
Napa	26,276		26,276	Do.
Nevada	39,596		39,596	Mineral, hilly, grazing.
Placer	21,422		21,422	Do.
Plumas	50		50	Do.
Shasta	171,295	2,160	173,455	Farming, grazing, timber, mineral
Siskiyou	143,277	32,067	175,344	Do.
Stanislaus	12,840		12,840	Mineral, hilly, grazing.
Sutter	317		317	Hilly, grazing.
Tehama	70,912	2,000	72,912	Hilly, grazing, mineral.

Statement showing the area of land unappropriated and unreserved on July 1, 1918—Con.

CALIFORNIA—Continued.

Land district and county.	Area in acres.			Character.
	Surveyed.	Unsurveyed.	Total.	
Sacramento—Continued.				
Trinity	28,809	4,700	33,509	Mountainous, grazing, timber, mineral.
Tuolumne	18,944	1,600	20,544	Mineral, grazing, timber.
Yolo	26,376		26,376	Hilly, grazing.
Yuba	5,857		5,857	Hilly, grazing, mineral.
Total	831,812	52,167	883,979	
San Francisco:				
Alameda	1,019	1,280	2,299	Mountainous.
Colusa	11,738		11,738	Do.
Contra Costa	1,300		1,300	Do.
Fresno	48,368	3,862	52,230	Do.
Glenn	1,920		1,920	Do.
Kern	20,166	640	20,806	Do.
Kings	1,847		1,847	Do.
Lake	141,161	2,560	143,721	Do.
Mendocino	180,946	2,222	183,168	Do.
Merced	5,642		5,642	Do.
Monterey	179,011	2,560	181,571	Do.
Napa	41,485		41,485	Do.
San Benito	165,415	8,960	174,375	Do.
San Joaquin	1,060		1,060	Do.
San Luis Obispo	184,107	2,473	186,580	Do.
Santa Barbara	14,287		14,287	Do.
Santa Clara	50,617	3,660	54,277	Do.
Solano	2,056		2,056	Do.
Sonoma	41,476	4,640	46,116	Do.
Stanislaus	19,164	2,600	21,764	Do.
Ventura	2,286		2,286	Do.
Yolo	6,400	640	7,040	Do.
Total	1,121,471	36,097	1,157,568	
Susanville:				
Lassen	915,648	24,521	940,169	Grazing, desert, timber, mineral.
Modoc	350,081	16,840	366,921	Do.
Plumas	8,885	2,591	11,476	Mountainous, timber, mineral.
Sierra	4,186		4,186	Do.
Total	1,278,800	43,952	1,322,752	
Visalia:				
Fresno	138,613	2,814	141,427	Mountainous, grazing.
Kern	154,890	26,724	181,614	Do.
Kings	15,313		15,313	Do.
Merced	8,361		8,361	Do.
Monterey	1,447		1,447	Do.
San Benito	7,886		7,886	Do.
Tulare	41,422	65,768	107,190	Do.
Total	367,932	95,306	463,238	
State total	15,900,150	4,628,884	20,529,034	

COLORADO.

Land district and county.	Surveyed.	Unsurveyed.	Total.	Character.
Del Norte:				
Alamosa	45,187	3,840	49,027	Grazing.
Chaffee	2,597		2,597	Do.
Conejos	188,647		188,647	Do.
Huerfano	5,279	3,840	9,119	Grazing; probably some timber.
Las Animas		29,440	29,440	Do.
Rio Grande	104,018		104,018	Grazing.
Saguache	292,480		292,480	Do.
Total	638,208	37,120	675,328	
Denver:				
Adams	40		40	Agricultural, grazing.
Arapahoe	160		160	Do.
Boulder	760		760	Mountainous, mineral.
Clear Creek	6,880	13,440	20,320	Do.
Douglas	2,120		2,120	Arid, grazing, broken
Eagle	12,600		12,600	Mountainous, grazing, mineral.
Elbert	800		800	Agricultural, grazing

Statement showing the area of land unappropriated and unreserved on July 1, 1918—Con.

COLORADO—Continued.

Land district and county.	Area in acres.			Character.
	Surveyed.	Unsurveyed.	Total.	
Denver—Continued.				
Gilpin	7,680	3,840	11,520	Mountainous, grazing, mineral.
Grand	110,350	13,860	124,210	Mountainous, grazing.
Jackson	239,030		239,030	Do.
Jefferson	9,380		9,380	Do.
Larimer	47,020		47,020	Do.
Morgan	560		560	Agricultural, grazing.
Routt		7,680	7,680	Mountainous, grazing, mineral.
Summit	4,920	4,630	9,550	Do.
Weld	680		680	Agricultural, grazing.
Total	442,980	43,450	486,430	
Durango:				
Archuleta	72,575		72,575	Agricultural, timber, grazing.
Dolores	7,233	46,762	53,995	Mountainous, agricultural, mineral.
La Plata	93,492	2,200	95,692	Grazing, agricultural, mineral.
Montezuma	49,434	12,940	62,374	Do.
Total	222,734	61,902	284,636	
Glenwood Springs:				
Eagle	32,642	205,157	237,799	Farming, grazing, mineral.
Garfield	764,688	191,088	955,776	Do.
Gunnison	440	7,840	8,280	Do.
Mesa	116,286	31,320	147,606	Do.
Moffat	1,410,238	318,625	1,728,863	Do.
Pitkin	28,606	24,300	52,906	Grazing, mineral.
Rio Blanco	1,169,054	176,906	1,345,960	Farming, grazing.
Routt	117,009	72,200	189,209	Farming, grazing, mineral.
Total	3,638,963	1,027,436	4,666,399	
Hugo:				
Cheyenne	317		317	Prairie, farming, and grazing.
Kit Carson	4,892		4,892	Do.
Lincoln	1,287		1,287	Do.
Total	6,496		6,496	
Lamar:				
Baca	56,532		56,532	Farm, prairie, hilly, grazing.
Bent	41,835		41,835	Broken, hilly, prairie, grazing.
Cheyenne	1,329		1,329	Prairie, grazing.
Kiowa	3,270		3,270	Rolling, prairie, grazing.
Las Animas	76,360		76,360	Broken, hilly, grazing.
Lincoln	140		140	Grazing.
Prowers	14,828		14,828	Prairie, hilly, grazing.
Total	194,294		194,294	
Leadville:				
Chaffee	69,234		69,234	Mountainous, mineral, grazing, agricultural.
Fremont	35,401		35,401	Grazing, agricultural, mineral.
Lake	8,382		8,382	Grazing, mountainous, mineral.
Park	247,341	10,844	258,185	Grazing, agricultural, mineral.
Summit	465		465	Grazing, mountainous, mineral.
Teller	6,917	280	7,197	Grazing, agricultural.
Total	367,740	11,124	378,864	
Montrose:				
Delta	189,132	55,560	244,692	Mountainous, coal, grazing.
Dolores	31,330	3,780	35,110	Mineral, grazing, arid.
Gunnison	465,060	89,040	554,100	Mountainous, coal, mineral, farming, grazing.
Hinsdale	104,280	11,200	115,480	Mountainous, mineral, timber, coal, grazing.
Mesa	606,149	203,700	809,849	Coal, farming, mineral, grazing.
Montrose	472,718	179,360	652,078	Do.
Ouray	27,040		27,040	Agricultural, grazing, mineral, and mountainous.
Saguache	130,240		130,240	Farming, grazing, mineral, timber.
San Miguel	250,502	73,100	323,602	Agricultural, grazing, coal, rich mineral.
Total	2,276,451	615,740	2,892,191	

Statement showing the area of land unappropriated and unreserved on July 1, 1918—Con.

COLORADO—Continued.

Land district and county.	Area in acres.			Character.
	Surveyed.	Unsurveyed.	Total.	
Pueblo:				
Alamosa	11,320		11,320	Mountainous.
Bent	10,010		10,010	Agricultural, grazing.
Crowley	960	7,040	8,000	Do.
Custer	27,960		27,960	Mountainous, grazing.
El Paso	3,800	1,320	5,120	Mountainous, agricultural, grazing.
Fremont	324,680		324,680	Do.
Huerfano	64,440		64,440	Do.
Kiowa		680	680	Grazing, agricultural.
Las Animas	118,856		118,856	Mountainous, agricultural, grazing.
Lincoln	3,070	720	3,790	Grazing, agricultural.
Otero	26,730	8,360	35,000	Do.
Pueblo	1,900		1,900	Agricultural, mountainous, grazing.
Saguache	21,760		21,760	Mountainous.
Teller	26,680		26,680	Mountainous, largely mineral.
Total	641,166	18,120	659,286	
Sterling:				
Logan	479	4,320	4,799	Sandy, grazing, agricultural.
Morgan	1,460	159	1,619	Sandy, grazing,
Phillips	561		561	Do.
Sedgwick	280		280	Do.
Washington	4,442		4,442	Do.
Weld	1,579	10,234	11,813	Sandy, grazing, agricultural.
Yuma	3,628	889	4,517	Sandy, grazing.
Total	12,429	15,602	28,031	
State total	8,441,461	1,830,494	10,271,955	

FLORIDA.

Gainesville:				
Alachua	1,197		1,197	Low, pine.
Baker	754		754	Do.
Bay	4,677		4,677	Do.
Bradford	731		731	Do.
Brevard	15,275		15,275	Low, pine, swamp
Calhoun	1,000		1,000	Low, pine.
Citrus	3,032		3,032	Do.
Clay	1,323		1,323	Do.
Columbia	474		474	Do.
De Soto	6,202		6,202	Do.
Escambia	914		914	Do.
Flagler	60		60	Do.
Gadsden	383		383	Do.
Hamilton	708		708	Do.
Hernando	640		640	Do.
Hillsborough	40		40	Do.
Holmes	287		287	Do.
Jackson	147		147	Do.
Jefferson	10		10	Do.
Lafayette	5,268		5,268	Low, pine, swamp.
Lake	16,119		16,119	Low, pine.
Lee	7,711		7,711	Low, pine, swamp.
Leon	160		160	Low, pine.
Levy	3,840		3,840	Do.
Liberty	724		724	Do.
Madison	760		760	Do.
Manatee	913		913	Do.
Marion	6,733		6,733	Do.
Monroe	1,778		1,778	Low, pine, swamp.
Nassau	265		265	Low, pine.
Okaloosa	200		200	Do.
Okeechobee	356		356	Do.
Orange	1,245		1,245	Do.
Osceola	437		437	Do.
Palm Beach	40		40	Do.
Pasco	480		480	Do.
Polk	1,242		1,242	Do.
Putnam	6,878		6,878	Do.
St. Johns	964		964	Do.

Statement showing the area of land unappropriated and unreserved on July 1, 1918 —Con.

FLORIDA—Continued.

Land district and county.	Area in acres.			Character.
	Surveyed.	Unsurveyed.	Total.	
Gainesville—Continued.				
St. Lucie	767	....	767	Low, pine.
Santa Rosa	359	....	359	Do.
Seminole	546	....	546	Do.
Sumter	120	....	120	Do.
Suwannee	433	....	433	Do.
Taylor	2,560	....	2,560	Do.
Volusia	8,445	....	8,445	Do.
Wakulla	360	....	360	Do.
Walton	5,513	....	5,513	Do.
Washington	1,656	....	1,656	Do.
State total	114,726	....	114,726	

IDAHO.

Land district and county.	Surveyed.	Unsurveyed.	Total.	Character.
Blackfoot:				
Bannock	114,360	31,640	146,000	Mountainous.
Bear Lake	42,940	22,500	65,440	Rough and broken.
Bingham	235,972	98,640	334,612	Rolling, lava, and dry.
Bonneville	33,820	57,380	91,200	Grazing.
Butte	96,223	45,000	141,223	Rolling, lava, and dry.
Franklin	760	1,280	2,040	Grazing.
Fremont	256,616	130,953	387,569	Agricultural and grazing.
Jefferson	172,246	142,680	314,926	Do.
Lemhi	....	1,920	1,920	Mountainous.
Madison	3,240	....	3,240	Grazing.
Oneida	110,900	41,360	152,260	Rough, grazing.
Power	73,880	....	73,880	Do.
Teton	1,280	2,000	3,280	Mountainous.
Total	1,142,237	575,353	1,717,590	
Boise:				
Ada	323,322	....	323,322	Arid, mountainous.
Adams	49,613	....	49,613	Mountainous, grazing, timber.
Boise	117,957	7,680	125,637	Mountainous, mineral, grazing, timber
Canyon	20,265	....	20,265	Arid, grazing.
Elmore	368,522	32,000	400,522	Arid, mountainous, mineral, timber, grazing.
Gem	53,786	14,080	67,866	Arid, mountainous, grazing, timber.
Idaho	30,500	136,850	167,350	Arid, mountainous, grazing, mineral, timber.
Owyhee	2,076,023	1,561,280	3,637,303	Arid, mountainous, mineral, grazing.
Payette	52,948	....	52,948	Arid, mountainous, grazing.
Valley	65,344	495,000	560,344	Arid, mountainous, grazing. mineral, timber.
Washington	155,350	26,880	182,230	Do.
Total	3,333,830	2,273,770	5,607,600	
Coeur d'Alene:				
Benewah	18,872	....	18,872	Agricultural, grazing, and timbered.
Bonner	20,627	....	20,627	Agricultural, grazing, timbered, and mineral.
Boundary	5,700	560	6,260	Do.
Kootenai	16,719	....	16,719	Agricultural, grazing. and timbered.
Shoshone	69,151	12,800	81,951	Agricultural, grazing, timbered, and mineral.
Total	131,069	13,360	144,429	
Hailey:				
Bingham	....	11,520	11,520	Lava and sagebrush plains.
Blaine	405,687	400,520	806,207	Mountainous, grazing, sagebrush.
Butte	362,206	283,480	645,686	Do.
Camas	107,163	20,000	127,163	Do.
Cassia	309,660	28,918	338,578	Grazing, sagebrush, somewhat mountainous.
Custer	546,993	386,440	933,433	Mountainous, grazing, sagebrush.
Elmore	124,292	16,000	140,292	Do.
Gooding	208,625	32,920	241,545	Lava and sagebrush plains.
Lemhi	418,126	197,320	615,446	Mountainous, grazing, sagebrush

Statement showing the area of land unappropriated and unreserved on July 1, 1918—Con.

IDAHO—Continued.

Land district and county.	Area in acres.			Character.
	Surveyed.	Unsurveyed.	Total.	
Hailey—Continued.				
Lincoln	347,579	260,800	608,379	Lava and sagebrush plains.
Minidoka	68,597	130,560	199,157	Do.
Owyhee	202,741	99,340	302,081	Grazing and sagebrush plains.
Power	49,259	80,640	129,899	Lava and sagebrush plains.
Twin Falls	353,775	70,560	424,335	Grazing and sagebrush plains.
Valley	20,968	199,150	220,118	Mountainous, grazing, sagebrush.
Total	3,465,611	2,278,228	5,743,839	
Lewiston:				
Clearwater	26,862	....	26,862	Mountainous.
Idaho	45,788	3,600	49,388	Mountainous, grazing.
Latah	1,217	....	1,217	Mountainous.
Lewis	5,983	....	5,983	Mountainous, grazing.
Nez Perce	12,678	10,680	23,358	Do.
Shoshone	2,450	....	2,450	Mountainous.
Total	94,978	14,280	109.258	
State total	8,167,725	5,154,991	13,322,716	

KANSAS.

Land district and county.	Surveyed.	Unsurveyed.	Total.	Character.
Dodge City:				
Barber	188	....	188	Broken, sandy.
Clark	669	....	669	Do.
Comanche	200	....	200	Do.
Edwards	198	....	198	Do.
Finney	36	....	36	Do.
Greeley	181	....	181	Agricultural.
Hamilton	400	....	400	Broken, sandy.
Kearn	210	....	210	Do.
Kiowa	40	....	40	Do.
Lane	280	....	280	Grazing, broken.
Meade	136	....	136	Broken, sandy.
Morton	400	....	400	Do.
Seward	398	....	398	Do.
Scott	400	....	400	Grazing, broken.
Stafford	41	....	41	Swampy.
Stanton	40	....	40	Grazing, broken.
Stevens	416	....	416	Broken, sandy.
Wichita	80	....	80	Grazing, broken.
Total	4,313	....	4,313	
Topeka:				
Cheyenne	240	....	240	Rough and broken.
Gove	320	....	320	Do.
Logan	80	....	80	Do.
Osborne	40	....	40	Do.
Rawlins	200	....	200	Do.
Sherman	42	....	42	Do.
Trego	40	....	40	Do.
Total	962	....	962	
State total	5,275	....	5,275	

LOUISIANA.

Land district and county.	Surveyed.	Unsurveyed.	Total.	Character.
Baton Rouge:				
Acadia	6	....	6	Prairie.
Allen	159	....	159	Pine woods.
Ascension	237	....	237	Swampy.
Avoyelles	974	....	974	Prairie, pine woods.
Beauregard	241	....	241	Pine woods.
Bienville	493	....	493	High, pine woods.
Bossier	1,151	....	1,151	Do.
Caddo	675	....	675	Do.
Calcasieu	1,620	....	1,620	Prairie, pine woods.

Statement showing the area of land unappropriated and unreserved on July 1, 1918—Con.

LOUISIANA—Continued.

Land district and county.	Area in acres.			Character.
	Surveyed.	Unsurveyed.	Total.	
Baton Rouge—Continued.				
Caldwell	4,906	....	4,906	High, pine woods.
Cameron	258	1,871	2,129	Prairie, marsh.
Catahoula	4,499	....	4,499	High, pine woods.
Claiborne	861	....	861	Pine woods.
Concordia	402	....	402	Alluvial.
De Soto	140	....	140	High, pine woods.
East Baton Rouge	20	....	20	Pine.
East Carroll	456	....	456	Low, pine woods.
East Feliciana	16	....	16	Pine woods.
Evangeline	81	....	81	Prairie, pine.
Franklin	26	....	26	Pine woods, hilly.
Grant	153	....	153	Do.
Iberia	1,080	....	1,080	Prairie, marsh.
Jackson	40	....	40	Pine woods, hilly.
Lafourche	281	....	281	Agricultural.
La Salle	603	....	603	Pine woods.
Lincoln	401	....	401	Agricultural.
Livingston	74	....	74	Hardwoods.
Madison	213	....	213	Low, pine woods.
Morehouse	166	....	166	Pine woods.
Natchitoches	366	....	366	Do.
Ouachita	791	....	791	Do.
Plaquemines	1,729	....	1,729	Prairie, marsh.
Pointe Coupee	654	....	654	Ordinary farming, swampy.
Rapides	369	....	369	Pine woods, agricultural.
Red River	10	....	10	Do.
Richland	196	....	196	Do.
Sabine	275	....	275	Do.
St. Charles	10	....	10	Do.
St. Helena	63	....	63	Pine woods.
St. James	243	....	243	Farming, swampy.
St. John	1,782	....	1,782	Do.
St. Landry	32	....	32	Prairie, pine woods.
St. Martin	728	....	728	Prairie, swampy.
St. Mary	441	....	441	Do.
St. Tammany	438	....	438	Pine woods.
Tangipahoa	38	....	38	Pine woods, swampy.
Tensas	58	....	58	Alluvial.
Terrebonne	3,101	....	3,101	Low, swampy.
Union	786	....	786	Pine woods, farming.
Vermilion	318	10,039	10,357	Prairie.
Vernon	161	....	161	Pine woods.
Washington	85	....	85	Pine woods, farming.
Webster	278	....	278	Pine woods.
West Feliciana	265	....	265	Pine woods, farming.
Winn	200	....	200	Do.
State total	33,649	11,910	45,559	

MICHIGAN.

Land district and county.	Surveyed.	Unsurveyed.	Total.	Character.
Marquette:				
Alcona	760	....	760	Light soil.
Alger	2,173	....	2,173	Fair farming.
Alpena	240	....	240	Do.
Antrim	160	....	160	Do.
Baraga	3,660	....	3,660	Do.
Benzie	40	....	40	Do.
Charlevoix	1,112	....	1,112	Do.
Cheboygan	790	....	790	Do.
Chippewa	9,550	....	9,550	Timbered, farming.
Clare	120	....	120	Fair, farming.
Crawford	840	....	840	Do.
Delta	4,843	....	4,843	Do.
Dickinson	1,600	....	1,600	Do.
Emmett	318	....	318	Do.
Gogebic	80	....	80	Do.
Grand Traverse	562	....	562	Do.
Houghton	40	....	40	Do.
Iosco	320	....	320	Light soil.
Iron	343	....	343	Fair farming.
Jackson	65	....	65	Wet.

Statement showing the area of land unappropriated and unreserved on July 1, 1918—Con.

MICHIGAN—Continued.

Land district and county.	Area in acres.			Character.
	Surveyed.	Unsurveyed.	Total.	
Marquette—Continued.				
Kalkaska	1,960	....	1,960	Light soil.
Keweenaw	11,087	....	11,087	Do.
Lake	120	....	120	Very light soil.
Leelanau	1,213	....	1,213	Fair farming.
Luce	3,529	....	3,529	Fair farming, some timber.
Mackinac	1,523	....	1,523	Fair farming.
Marquette	5,280	....	5,280	Timbered, farming.
Menominee	680	....	680	Fair farming.
Missaukee	320	....	320	Do.
Montmorency	2,100	....	2,100	Do.
Oakland	40	....	40	Wet.
Oceana	658	....	658	Very sandy.
Ogemaw	200	....	200	Sandy, light soil.
Ontonagon	460	....	460	Timbered, farming.
Oscoda	1,573	....	1,573	Light soil.
Otsego	1,680	....	1,680	Fair farming.
Presque Isle	1,120	....	1,120	Do.
Roscommon	395	....	395	Do.
Schoolcraft	11,275	....	11,275	Do.
State total	72,829	....	72,829	

MINNESOTA.

Land district and county.	Surveyed.	Unsurveyed.	Total.	Character.
Cass Lake:				
Beltrami	140,200	....	140,200	Timbered, agricultural, swampy.
Cass	1,040	....	1,040	Swampy.
Hubbard	80	....	80	Do.
Itasca	1,580	....	1,580	Timbered, agricultural.
Koochiching	102,880	....	102,880	Timbered, agricultural, swampy.
Total	245,780	....	245,780	
Crookston:				
Beltrami	148,381	....	148,381	Swamp, some timber.
Clearwater	2,437	....	2,437	Swamp, cut-over pine.
Roseau	17,295	....	17,295	Swamp, some timber.
Total	168,113	....	168,113	
Duluth:				
Aitkin	480	....	480	Low, wet.
Carlton	160	....	160	Swampy.
Cass	480	....	480	Low, wet, sandy.
Cook	11,440	....	11,440	Broken, rough, swamp.
Crow Wing	16	....	16	Fractional lots.
Hubbard	40	....	40	Swamp.
Itasca	600	....	600	Broken, rough.
Koochiching	21,360	....	21,360	Agricultural, swamp.
Lake	5,080	....	5,080	Broken, rocky, swamp.
Morrison	64	....	64	Low, wet.
Pine	200	....	200	Sandy, low.
Pope	40	....	40	Swamp.
St. Louis	15,920	....	15,920	Broken, swamp, agricultural.
Wabasha	80	....	80	Sandy.
Wadena	80	....	80	Do.
Winona	40	....	40	Agricultural.
Total	56,080	....	56,080	
State total	469,973	....	469,973	

MISSISSIPPI.

Land district and county.	Surveyed.	Unsurveyed.	Total.	Character.
Jackson:				
Adams	1,234	....	1,234	Agricultural, timbered.
Amite	695	....	695	Do.
Attala	1,520	....	1,520	Agricultural.
Bolivar	416	....	416	Do.

Statement showing the area of land unappropriated and unreserved on July 1, 1918—Con

MISSISSIPPI—Continued.

Land district and county.	Area in acres.			Character.
	Surveyed.	Unsurveyed.	Total.	
Jackson—Continued.				
Calhoun	80	....	80	Agricultural.
Carroll	360	....	360	Do.
Choctaw	360	....	360	Agricultural, timbered.
Claiborne	1,117	....	1,117	Agricultural.
Clarke	960	....	960	Do.
Clay	80	....	80	Agricultural, timbered.
Copiah	1,342	....	1,342	Agricultural.
Covington	442	....	442	Do.
Forrest	344	....	344	Pine woods, farming.
Franklin	494	....	494	Agricultural, timbered.
George	1,665	....	1,665	Pine belt, level.
Greene	3,447	....	3,447	Agricultural, timbered.
Grenada	1,320	....	1,320	Do.
Hancock	500	....	500	Do.
Harrison	400	....	400	Do.
Hinds	534	....	534	Do.
Holmes	120	....	120	Do.
Issaquena	228	....	228	Do.
Jackson	4,632	....	4,632	Do.
Jasper	480	....	480	Do.
Jefferson	834	....	834	Farming, some broken.
Jefferson Davis	200	....	200	Agricultural.
Jones	610	....	610	Agricultural, timbered.
Kemper	760	....	760	Do.
Lamar	80	....	80	Pine woods, farming.
Lauderdale	1,044	....	1,044	Pine belt.
Lawrence	455	....	455	Timbered, farming.
Leake	520	....	520	Agricultural, timbered.
Leflore	200	....	200	Hilly, farming.
Lincoln	552	....	552	Do.
Loundes	160	....	160	Farming.
Madison	197	....	197	Agricultural, timbered.
Marion	141	....	141	Level, farming, grazing.
Monroe	1,014	....	1,014	Agricultural, timbered.
Montgomery	1,000	....	1,000	Do.
Neshoba	440	....	440	Do.
Newton	280	....	280	Do.
Noxubee	315	....	315	Do.
Oktibbeha	160	....	160	Farming.
Panola	80	....	80	Generally level, farming.
Pearl River	1,043	....	1,043	Level, pine woods.
Perry	720	....	720	Agricultural, timbered.
Pike	160	....	160	Do.
Quitman	86	....	86	Do.
Rankin	417	....	417	Do.
Scott	360	....	360	Do.
Simpson	360	....	360	Do.
Smith	253	....	253	Generally level, farming.
Stone	160	....	160	Agricultural.
Sunflower	12	....	12	Level, agriculture.
Tallahatchie	80	....	80	Generally level, farming.
Walthall	120	....	120	Agricultural, timbered.
Warren	597	....	597	Do.
Wayne	2,240	....	2,240	Do.
Webster	1,304	....	1,304	Do.
Wilkinson	1,310	....	1,310	Do,
Winston	440	....	440	Do.
Yalobusha	360	....	360	Swampy, farming.
Yazoo	240	....	240	Agricultural, timbered.
State total	42,064	....	42,064	

MISSOURI.

Land district and county.	Surveyed.	Unsurveyed.	Total.	Character.
Springfield:				
Barry	21	....	21	Rather broken and hilly.
Butler	5	....	5	Swamp land.
Camden	40	....	40	Broken and rocky.
Carter	15	....	15	Broken and hilly.
Shannon	8	....	8	Do.
Ste. Genevieve	58	....	58	Do.
State total	147	....	147	

Statement showing the area of land unappropriated and unreserved on July 1, 1918—Con.

MONTANA.

Land district and county.	Area in acres.			Character.
	Surveyed.	Unsurveyed.	Total.	
Billings:				
Big Horn	9,019	15,360	24,379	Mountainous, grazing.
Carbon	72,413	149,366	221,779	Do.
Musselshell	5,341	....	5,341	Agricultural, grazing.
Rosebud	2,111	....	2,111	Mountainous, grazing.
Stillwater	1,408	....	1,408	Do.
Yellowstone	9,872	....	9,872	Do.
Total	100,164	164,726	264,890	
Bozeman:				
Beaverhead	16,306	47,520	63,826	Grazing and mountainous.
Broadwater	9,461	....	9,461	Do.
Carbon	4,483	4,080	8,563	Do.
Gallatin	21,442	....	21,442	Do.
Jefferson	10,698	8,723	19,421	Do.
Madison	67,682	51,520	119,202	Do.
Park	33,700	4,220	37,920	Do.
Stillwater	29,591	3,520	33,111	Do.
Sweet Grass	73,682	1,440	75,122	Do.
Total	267,045	121,023	388,068	
Glasgow:				
Dawson	99,320	103,500	202,820	Agricultural, grazing.
Phillips	271,721	225,547	497,268	Do.
Richland	35,873	....	35,873	Do.
Sheridan	124,088	....	124,088	Do.
Valley	351,000	350,500	701,500	Do.
Total	882,002	679,547	1,561,549	
Great Falls:				
Cascade	26,665	30,916	57,581	Grazing, broken, agricultural.
Chouteau	17,996	....	17,996	Do.
Fergus	3,961	....	3,961	Do.
Hill	7,722	....	7,722	Do.
Lewis and Clark	7,183	....	7,183	Mountainous, grazing, agricultural.
Teton	55,949	22,427	78,376	Do.
Toole	15,583	....	15,583	Grazing, broken, agricultural.
Total	135,059	53,343	188,402	
Havre:				
Blaine	93,880	325,000	418,880	Mountainous, agricultural, grazing.
Chouteau	42,240	63,153	105,393	Do.
Hill	63,200	....	63,200	Do.
Phillips	104,480	465,500	569,980	Do.
Toole	13,200	4,160	17,360	Do.
Total	317,000	857,813	1,174,813	
Helena:				
Beaverhead	207,344	333,500	540,844	Grazing.
Broadwater	36,720	....	36,720	Do.
Cascade	1,640	....	1,640	Do.
Deer Lodge	10,200	....	10,200	Do.
Jefferson	44,610	15,000	59,610	Do.
Lewis and Clark	67,700	184,000	251,700	Do.
Madison	60,113	138,000	198,113	Do.
Meagher	27,500	11,500	39,000	Do.
Park	160	11,500	11,660	Do.
Powell	70,765	51,000	121,765	Do.
Silver Bow	28,040	6,000	34,040	Do.
Sweet Grass	275	....	275	Do.
Teton	1,600	....	1,600	Do.
Total	556,667	750,500	1,307,167	
Kalispell:				
Flathead	62,500	....	62,500	Mountainous, timber, some agriculture.
Lincoln	3,460	....	3,460	Agriculture.
Sanders	29,300	....	29,300	Mountainous, timber, some agriculture
Teton	600	....	600	Grazing.
Total	95,860	....	95,860	

Statement showing the area of land unappropriated and unreserved on July 1, 1918—Con.

MONTANA—Continued.

Land district and county.	Area in acres.			Character.
	Surveyed.	Unsurveyed.	Total.	
Lewistown:				
Chouteau	9,320	....	9,320	Rough, grazing.
Dawson	180,860	10,280	191,140	Farming, grazing.
Fergus	226,840	155,280	382,120	Farming, grazing, mountainous.
Musselshell	8,140	19,280	27,420	Do.
Rosebud	5,000	....	5,000	Rough, grazing.
Sweet Grass	680	....	680	Do.
Wheatland	2,280	....	2,280	Do.
Total	433,120	184,840	617,960	
Miles City:				
Big Horn	22,049	138,240	160,289	Grazing, agricultural.
Carter	25,820	628,846	654,666	Do.
Custer	105,924	380,160	486,084	Do.
Dawson	91,685	623,736	715,421	Do.
Fallon	30,777	....	30,777	Do.
Prairie	74,749	....	74,749	Do.
Richland	5,146	....	5,146	Do.
Rosebud	19,379	86,036	105,415	Do.
Wibaux	11,155	....	11,155	Do.
Total	386,683	1,857,018	2,243,701	
Missoula:				
Beaverhead	12,757	5,000	17,757	Arid, grazing.
Granite	30,773	93,180	123,953	Mountainous, timber, mineral.
Mineral	58,497	....	58,497	Do.
Missoula	23,821	37,636	61,457	Do.
Powell	29,133	25,880	55,013	Do.
Ravalli	1,609	388	1,997	Mountainous, timber, grazing.
Sanders	5,773	34,162	39,935	Mountainous, timber, mineral.
Total	162,363	196,246	358,609	
State total	3,335,963	4,865,056	8,201,019	

NEBRASKA.

Alliance:				
Arthur	360	....	360	Sand hill, grazing.
Banner	1,720	....	1,720	Prairie, table land.
Box Butte	1,840	....	1,840	Broken, grazing.
Dawes	2,420	....	2,420	Rough, grazing.
Garden	2,150	....	2,150	Sand hill, grazing.
Grant	360	....	360	Do.
Morrill	2,620	2,647	5,267	Do.
Scotts Bluff	16,180	....	16,180	Mountainous, agricultural.
Sheridan	4,930	....	4,930	Sand hill, grazing.
Sioux	8,180	....	8,180	Broken, grazing.
Total	40,760	2,647	43,407	
Broken Bow:				
Arthur	1,531	....	1,531	Sandy, grazing, small valleys.
Blaine	2,049	....	2,049	Do.
Brown	1,921	....	1,921	Do.
Cherry	5,532	....	5,532	Do.
Custer	120	....	120	Do.
Grant	3,010	....	3,010	Do.
Hooker	6,889	....	6,889	Do.
Logan	1,201	....	1,201	Do.
McPherson	1,886	....	1,886	Do.
Thomas	4,253	....	4,253	Do.
Total	28,392	....	28,392	
Lincoln:				
Chase	159	....	159	Broken, sandy, grazing.
Dundy	518	....	518	Do.
Frontier	120	....	120	Do.
Hayes	678	....	678	Broken, grazing.
Hitchcock	402	....	402	Broken, sandy, grazing.
Red Willow	180	....	180	Broken, grazing.
Total	2,057	....	2,067	

Statement showing the area of land unappropriated and unreserved on July 1, 1918—Con.

NEBRASKA—Continued.

Land district and county.	Area in acres.			Character.
	Surveyed.	Unsurveyed.	Total.	
North Platte:				
Arthur	1,122		1,122	Grazing land.
Banner	120		120	Do.
Deuel	26		26	Do.
Garden	438		438	Do.
Keith	120		120	Do.
Lincoln	967		967	Do.
Logan	318		318	Do.
McPherson	1,044		1,044	Do.
Morrill	202		202	Do.
Total	4,357		4,357	
O'Neill:				
Boone	80		80	Rough, sandy.
Boyd	631		631	Rough, and overflowed bottom.
Brown	160		160	Rough, sandy.
Burt	302		302	Overflowed bottom.
Dakota	288		288	Do.
Garfield	706		706	Rough, sandy.
Holt	678		678	Do.
Knox	372		372	Overflowed bottom.
Loup	1,120		1,120	Rough, sandy.
Rock	160		160	Do.
Sarpy	18		18	Overflowed bottom.
Washington	85		85	Do.
Wheeler	200		200	Rough, sandy.
Total	4,800		4,800	
Valentine:				
Brown	1,868		1,868	Rough, sandy, grazing.
Cherry	22,395		22,395	Do.
Keya Paha	640		640	Do.
Rock	640		640	Do.
Total	25,543		25,543	
State total	105,909	2,647	108,556	

NEVADA.

Land district and county.	Surveyed.	Unsurveyed.	Total.	Character.
Carson City:				
Churchill	1,343,636	1,293,127	2,636,763	Mountainous, arid, grazing, little timber.
Clark	3,168,177	1,171,388	4,339,565	Do.
Douglass	183,747	4,402	188,149	Do.
Esmeralda	1,085,371	906,528	1,991,899	Do.
Eureka	18,201	40,070	58,271	Mountainous, arid, grazing.
Humboldt	2,608,388	3,710,091	6,318,479	Do.
Lander	103,576	26,793	130,369	Do.
Lincoln	2,090,141	3,958,698	6,048,839	Do.
Lyon	358,068	208,051	566,119	Do.
Mineral	1,228,510	648,488	1,876,998	Mountainous, arid, little timber.
Nye	3,368,288	5,498,530	8,866,818	Mountainous, arid, grazing, little timber.
Ormsby	24,225	19,980	44,205	Mountainous, arid, grazing, second growth.
Story	97,929	1,272	99,201	Mountainous, arid, grazing.
Washoe	2,258,131	637,885	2,896,016	Mountainous, arid, grazing, second growth.
White pine		19,300	19,300	Mountainous, arid, grazing, little timber.
Total	17,936,388	18,144,603	36,080,991	
Elko:				
Churchill	127,420	7,000	134,420	Mountainous, arid, grazing, little timber.
Elko	6,336,278	732,565	7,068,843	Do.
Eureka	1,037,127	1,096,360	2,133,487	Mountainous, arid, grazing, no timber.
Humboldt	1,405,005	199,426	1,604,431	Do.
Lander	1,043,950	1,096,525	2,140,475	Do.

Statement showing the area of land unappropriated and unreserved on July 1, 1918—Con.

NEVADA—Continued.

Land district and county.	Area in acres.			Character.
	Surveyed.	Unsurveyed.	Total.	
Elko—Continued.				
Lincoln	653,978	101,184	755,162	Mountainous, arid, grazing, little timber.
Nye	427,309	147,103	574,412	Mountainous, arid, grazing, no timber
White pine	2,880,708	1,709,261	4,589,969	Do.
Total	13,911,785	5,089,424	19,001,209	
State total	31,848,173	23,234,027	55,082,200	

NEW MEXICO.

Land district and county.	Surveyed.	Unsurveyed.	Total.	Character.
Clayton:				
Colfax	21,400	....	21,400	Arid, broken, grazing.
Mora	11,800	....	11,800	Mostly grazing, some broken.
Quay	3,200	....	3,200	Grazing.
San Miguel	17,100	....	17,100	Do.
Union	201,200	....	201,200	Grazing, broken.
Total	254,700	....	254,700	
Fort Sumner:				
Chaves	275,020	....	275,020	Broken, grazing.
Curry	6,580	....	6,580	Grazing.
De Baca	415,740	....	415,740	Do.
Guadalupe	211,500	....	211,500	Do.
Lincoln	407,420	....	407,420	Do.
Roosevelt	19,460	....	19,460	Broken, grazing.
Total	1,335,720	....	1,335,720	
Las Cruces:				
Dona Anna	1,449,354	281,119	1,730,473	Grazing, mountainous.
Grant	458,363	596,676	1,055,039	Do.
Luna	743,316	203,055	946,371	Do.
Otero	1,189,039	304,943	1,493,982	Do.
Sierra	1,135,031	279,202	1,414,233	Do.
Socorro	1,786,045	1,100,237	2,886,282	Do.
Total	6,761,148	2,765,232	9,526,380	
Roswell:				
Chaves	667,280	329,160	996,440	Grazing, rolling prairie.
Eddy	571,020	515,740	1,086,760	Mostly prairie, timber in mountains.
Lea	229,700	66,560	296,260	Grazing, level plains.
Lincoln	322,020	246,920	568,940	Grazing, timber in mountains.
Otero	85,840	593,080	678,920	Grazing.
Roosevelt	35,120	....	35,120	Grazing, level plains, and sand hills.
Socorro	6,880	81,920	88,800	Undulating prairie.
Torrance	35,760	....	35,760	Prairie, grazing.
Total	1,953,620	1,833,380	3,787,000	
Santa Fe:				
Bernalillo	32,271	21,700	53,971	Timber, grazing, and agricultural.
Colfax	360	....	360	Mountainous, grazing, coal.
Guadalupe	69,320	2,343	71,663	Grazing, agricultural.
McKinley	395,432	114,000	509,432	Mountainous, timber, grazing, coal.
Mora	1,280	....	1,280	Mountainous, grazing, agricultural, coal.
Rio Arriba	337,979	280,509	618,488	Do.
Sandoval	310,759	92,963	403,722	Do.
San Juan	734,217	11,029	745,246	Grazing, agricultural, coal.
San Miguel	31,500	68,250	99,750	Timber, grazing, agricultural.
Santa Fe	21,400	20,693	42,093	Mountainous, grazing, coal.
Socorro	499,255	17,940	517,195	Do.
Taos	125,560	132,380	257,940	Mountainous, grazing, timber, agricultural.
Torrance	63,370	31,859	95,229	Timber, grazing, saline, agricultural.
Valencia	694,112	11,520	705,632	Do.
Total	3,316,815	805,186	4,122,001	

Statement showing the area of land unappropriated and unreserved on July 1, 1918—Con.

NEW MEXICO—Continued.

Land district and county.	Area in acres.			Character.
	Surveyed.	Unsurveyed.	Total.	
Tucumcari:				
Curry	723	....	723	Grazing, agricultural, some broken.
Guadalupe	5,035	....	5,035	Broken, grazing, some agricultural.
Quay	42,480	5,300	47,780	Grazing, agricultural, some broken.
San Miguel	2,790	5,500	8,290	Broken, grazing, some agricultural.
Union	19,185	8,740	27,925	Rolling, grazing, some agricultural.
Total	70,213	19,540	89,753	
State total	13,692,216	5,423,338	19,115,554	
NORTH DAKOTA.				
Bismarck:				
Burleigh	1,095	....	1,095	Agricultural and grazing.
Emmons	424	....	424	Do.
Grant	206	....	206	Do.
Logan	970	....	970	Do.
McIntosh	372	....	372	Do.
McLean	592	....	592	Do.
Mercer	810	....	810	Do.
Morton	309	....	309	Do.
Oliver	116	....	116	Do.
Sioux	4,617	....	4,617	Do.
Total	9,511	....	9,511	
Dickinson:				
Billings	8,773	....	8,773	Rough, grazing.
Bowman	24,560	....	24,560	Do.
Dunn	7,840	....	7,840	Do.
Golden Valley	1,320	....	1,320	Do.
McKenzie	17,600	....	17,600	Do.
Slope	2,760	....	2,760	Do.
Total	62,853	....	62,853	
Minot:				
Benson	84	....	84	Grazing.
Bottineau	137	....	137	Do.
Burke	365	....	365	Do.
Cavalier	159	....	159	Do.
McHenry	797	....	797	Do.
McLean	421	....	421	Do.
Mountrail	5,873	....	5,873	Do.
Pierce	604	....	604	Do.
Renville	278	....	278	Do.
Sheridan	40	....	40	Do.
Ward	1,242	....	1,242	Do.
Total	10,000	....	10,000	
Williston:				
Burke	40	....	40	Broken, grazing.
Divide	1,736	....	1,736	Do.
McKenzie	21,854	....	21,854	Broken, grazing, and farming.
Mountrail	2,434	....	2,434	Broken, grazing.
Williams	7,710	....	7,710	Do.
Total	33,774	....	33,774	
State total	116,138	....	116,138	
OKLAHOMA.				
Guthrie:				
Alfalfa	40	....	40	Grazing.
Beaver	717	....	717	Do.
Beckham	1,363	....	1,363	Rough, grazing.
Blaine	327	....	327	Grazing.

Statement showing the area of land unappropriated and unreserved on July 1, 1918—Con.

OKLAHOMA—Continued.

Land district and county.	Area in acres.			Character.
	Surveyed.	Unsurveyed.	Total.	
Guthrie—Continued.				
Canadian	613		613	Sandy, grazing.
Cimarron	5,620		5,620	Grazing.
Cleveland	669		669	Sandy, grazing.
Custer	343		343	Grazing.
Dewey	3,470		3,470	Do.
Ellis	3,716		3,716	Sandy, grazing.
Grant	5		5	Rough, grazing.
Greer	390		390	Do.
Harmon	820		820	Do.
Harper	710		710	Grazing.
Jackson	990		990	Sandy, grazing.
Kingfisher	76		76	Do.
Major	3,324		3,324	Rough, grazing.
Pottawatomie	135		135	Sandy, grazing.
Roger Mills	3,070		3,070	Rough, grazing.
Texas	1,290		1,290	Grazing.
Woods	2,966		2,966	Rough, grazing.
Woodward	1,061		1,061	Grazing.
State total	31,715		31,715	

OREGON.

Land district and county.	Surveyed.	Unsurveyed.	Total.	Character.
Burns:				
Crook	54,925		54,925	Grazing, timber, and farming.
Grant	98,577	480	99,057	Do.
Harney	3,406,848	35,791	3,442,639	Do.
Wheeler	6,400		6,400	Do.
Total	3,566,750	36,271	3,603,021	
La Grande:				
Baker	182,680	4,899	187,579	Timbered, mountainous, grazing, mineral, and farming.
Grant	57,840		57,840	Timbered, farming, grazing, and mineral.
Morrow	10,640		10,640	Timbered, farming, and grazing.
Umatilla	37,920	291	38,211	Timbered, farming, grazing, and arid.
Union	11,000		11,000	Timbered, farming, and grazing.
Wallowa	45,440		45,440	Mountainous, farming, and grazing.
Total	345,520	5,190	350,710	
Lakeview:				
Deschutes and Crook	409,775		409,775	Agricultural, mountainous, and grazing.
Klamath	971,516	95,232	1,066,748	Agricultural, timber, and grazing.
Lake	2,569,631	134,262	2,703,893	Agricultural, mountainous, timber, and grazing.
Total	3,950,922	229,494	4,180,416	
Portland:				
Benton	2,510		2,510	Hilly, grazing, farming.
Clackamas	9,674		9,674	Mountainous, timber, grazing.
Clatsop	1,076		1,076	Broken, grazing, agricultural.
Columbia	80		80	Do.
Lincoln	13,322		13,322	Do.
Linn	1,475		1,475	Do.
Marion	536		536	Do.
Multnomah	880		880	Mountainous.
Polk	600		600	Broken, grazing, agricultural.
Tillamook	18,312		18,312	Hilly, timber, grazing, farming.
Washington	160		160	Do.
Yamhill	630		630	Do.
Total	49,255		49,255	
Roseburg:				
Benton	2,733		2,733	Timber, grazing.
Coos	16,318	1,580	17,898	Timber, agricultural.
Curry	35,230	2,100	37,330	Mountainous, timber.
Douglas	34,603	5,120	39,723	Mineral, grazing, timber.
Jackson	264,286	2,240	266,526	Timber, grazing, fruit.

Statement showing the area of land unappropriated and unreserved on July 1, 1918—Con.

OREGON—Continued.

Land district and county.	Area in acres.			Character.
	Surveyed.	Unsurveyed.	Total.	
Roseburg—Continued.				
Josephine	116,120	8,976	125,096	Timber, farming, mineral.
Klamath	3,040		3,040	Timber.
Lane	29,771		29,771	Timber, farming, mineral.
Lincoln	822		822	Broken, grazing.
Linn	284		284	Hilly, grazing.
Total	503,207	20,016	523,223	
The Dalles:				
Crook	209,853	1,260	211,113	Grazing, broken, hilly, mountainous.
Deschutes	139,329		139,329	Do.
Gilliam	7,060	1,760	8,820	Do.
Grant	28,008		28,008	Do.
Hood River	40		40	Do.
Jefferson	36,653	7,680	44,333	Do.
Morrow	3,568		3,568	Do.
Sherman	20,071	640	20,711	Do.
Wasco	17,241		17,241	Do.
Wheeler	20,513		20,513	Do.
Total	482,336	11,340	493,676	
Vale:				
Baker	141,954		141,954	Grazing, dry farming, timber.
Grant	11,895		11,895	Mountainous, timber.
Harney	437,713		437,713	Grazing, dry farming.
Malheur	3,880,267	653,461	4,533,728	Grazing, dry farming, some timber.
Total	4,471,829	653,461	5,125,290	
State total	13,369,819	955,772	14,325,591	

SOUTH DAKOTA.

Bellefourche:				
Butte	153,500		153,500	Prairie, grazing, farming.
Harding	30,140		30,140	Do.
Meade	1,360		1,360	Broken, grazing
Total	185,000		185,000	
Gregory:				
Bennett	33,170		33,170	Grazing, sand hills.
Gregory	67		67	Very rough, grazing.
Melette	3,670		3,670	Rough, rolling, grazing.
Total	36,907		36,907	
Lemmon:				
Corson	52,760		52,760	Prairie, rough, many buttes and stony hills.
Harding	56,600		56,600	Do.
Perkins	14,640		14,640	Do.
Sioux	840		840	Do.
Total	124,840		124,840	
Pierre:				
Brule	280		280	Rough, hilly, grazing.
Campbell	526		526	Do.
Charles Mix	136		136	Do.
Clark	80		80	Low, wet.
Clay	158		158	Low, wet, sand bar.
Day	36		36	Low, wet, small tracts.
Edmunds	240		240	Low, wet, lake bed.
Faulk	110		110	Do.
Haakon	8,310		8,310	Rough, hilly, grazing.
Hughes	188		188	Do.
Jackson	22,645		22,645	Do.
Jones	580		580	Do.
Kingsbury	12		12	Low, wet.
Potter	200		200	Rough, hilly, grazing.

Statement showing the area of land unappropriated and unreserved on July 1, 1918—Con.

SOUTH DAKOTA—Continued.

Land district and county.	Area in acres.			Character.
	Surveyed.	Unsurveyed.	Total.	
Pierre—Continued.				
Spink	320		320	Low, swampy, lake bed.
Stanley	12,335		12,335	Rough, hilly, grazing.
Sully	892		892	Do.
Walworth	266		266	Do.
Total	47,314		47,314	
Rapid City:				
Custer	27,630	25,568	53,198	Mountainous, timbered, mineral, grazing land.
Fall River	44,520		44,520	Prairie, broken, grazing land.
Lawrence	960	18,618	19,578	Mountainous, timbered, mineral, grazing land.
Meade	27,480		27,480	Prairie, broken, grazing land.
Pennington	102,350		102,350	Part mountainous, timbered, mineral, part prairie, broken, grazing land.
Total	202,940	44,186	247,126	
Timber Lake:				
Corson	29,030		29,030	Grazing, broken, hilly.
Dewey	51,381		51,381	Do.
Ziebach	115,628		115,628	Do.
Total	196,039		196,039	
State total	793,040	44,186	837,226	

UTAH.

Land district and county.	Surveyed.	Unsurveyed.	Total.	Character.
Salt Lake City:				
Beaver	557,965	720,108	1,278,073	Generally arid, agricultural, mineral, grazing, mountainous.
Box Elder	1,332,110	549,982	1,882,092	Do.
Cache	12,381	227,537	239,918	Do.
Carbon	579,834	22,578	602,412	Do.
Davis	29,482		29,482	Do.
Duchesne	109,271	74,880	184,151	Do.
Emery	698,425	644,292	1,342,717	Do.
Garfield	591,980	1,856,795	2,448,775	Do.
Grand	769,423	1,132,186	1,901,609	Do.
Iron	1,001,020	25,175	1,026,195	Do.
Juab	743,286	1,035,498	1,778,784	Do.
Kane	602,439	1,724,663	2,327,102	Do.
Millard	1,106,026	2,247,738	3,353,764	Do.
Morgan	16,172	12,246	28,418	Do.
Piute	108,564	78,795	187,359	Do.
Rich	268,134		268,134	Do.
Salt Lake	3,824	29,318	33,142	Do.
San Juan	1,035,015	2,805,857	3,840,872	Do.
Sanpete	284,732	31,760	316,492	Do.
Sevier	418,422	39,369	457,791	Do.
Summit	67,255	7,557	74,812	Do.
Tooele	1,531,357	1,955,361	3,486,718	Do.
Utah	44,333	361,910	406,243	Do.
Wasatch	24,578	1,250	25,828	Do.
Washington	667,569	49,435	717,004	Do.
Wayne	343,431	1,078,076	1,421,507	Do.
Weber	71,397		71,397	Do.
Total	13,008,425	16,712,366	29,720,791	
Vernal:				
Duchesne	103,066		103,066	Agricultural, grazing.
Summit	5,785		5,785	Mountainous.
Uintah	860,094	749,470	1,609,564	Arid, mountainous, mineral, agricultural.
Wasatch	32,953	3,740	36,693	Do.
Total	1,001,918	753,210	1,755,128	
State total	14,010,343	17,465,576	31,475,919	

Statement showing the area of land unappropriated and unreserved on July 1, 1918—Con

WASHINGTON.

Land district and county.	Area in acres.			Character.
	Surveyed.	Unsurveyed.	Total.	
Seattle:				
Clallam	940		940	Burned over mountain.
Jefferson	160		160	Rough.
King	1,820	[1] 61,440	63,260	Rocky, mountainous.
Mason	200		200	Mountainous.
Pierce		[2] 56,000	56,000	Do.
San Juan	640		640	Rough, rocky.
Skagit	1,840	1,800	3,640	Do.
Snohomish		[3] 44,120	44,120	Rough, timbered.
Whatcom	2,240	1,000	3,240	Rough.
Total	7,840	164,360	172,200	
Spokane:				
Adams	729		729	Poor farming, desert.
Douglas	172		172	Scabland.
Ferry	200,000	2,066	202,066	Timber, mineral, grazing.
Lincoln	14,537		14,537	Arid, poor farming, grazing.
Okanogan	20,525		20,525	Grazing, farming, mineral.
Pend Oreille	40,833		40,833	Mountainous, timbered.
Spokane	617		617	Scabland, rough.
Stevens	113,824	6,877	120,701	Timbered, farming, grazing, mineral.
Whitman	535		535	Grazing, poor.
Total	391,772	8,943	400,715	
Vancouver:				
Clarke	4,457		4,457	Foothills, rough, some timber.
Cowlits	4,268		4,268	Do.
Klickitat	23,982	2,810	26,792	Rough, grazing, little timber.
Lewis	2,749	[4] 65,265	68,014	Rough, some timber, grazing.
Pacific	54		54	Rough.
Skamania	7,087	[5] 79,420	86,507	Mountainous, some timber.
Wahkiakum	278		278	Broken, rough.
Total	42,875	147,495	190,370	
Walla Walla:				
Adams	9,068		9,068	Grazing, desert, poor farming.
Asotin	16,623		16,623	Mountainous, grazing, some farming.
Benton	31,471		31,471	Grazing, desert.
Columbia	2,350		2,350	Mountainous, grazing, some timber.
Franklin	33,320		33,320	Grazing, desert.
Garfield	551		551	Grazing, mountainous.
Klickitat	8,640		8,640	Grazing, desert.
Walla Walla	2,872		2,872	Grazing, some timber.
Whitman	2,885		2,885	Grazing, some farming.
Total	107,780		107,780	
Waterville:				
Chelan	13,795	7,313	21,108	Mountainous, timber, grazing.
Douglas	31,935		31,935	Rough, grazing.
Grant	49,735		49,735	Sandy, grazing.
Kittitas	822		822	Rough, grazing.
Okanogan	85,188		85,188	Mountainous, farming, grazing.
Total	181,475	7,313	188,788	
Yakima:				
Benton	69,360		69,360	Semiarid, mountainous.
Grant	23,080		23,080	Do.
Kittitas	59,820		59,820	Semiarid, mountainous, timbered.
Yakima	47,870		47,870	Do.
Total	200,130		200,130	
State total	931,872	328,111	1,259,983	

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[1] Including 59,520 acres within odd-section grant to Northern Pacific Ry. Co.

[2] Within odd-section grant to Northern Pacific Ry. Co.

[3] Including 43,980 acres within odd-section grant to Northern Pacific Ry. Co.

[4] Including 62,010 acres within odd-section grant to the Northern Pacific Ry. Co.

[5] Within odd-section grant to Northern Pacific Ry. Co.

Statement showing the area of land unappropriated and unreserved on July 1, 1918—Con.

WISCONSIN.

Land district and county.	Area in acres.			Character.
	Surveyed.	Unsurveyed.	Total.	
Wausau:				
Adams	177	....	177	Sandy soil, slightly rolling.
Ashland	166	....	166	Sandy soil, some mixed with loam.
Bayfield	1,399	....	1,399	Rolling, sandy loam.
Buffalo	240	....	240	Agricultural.
Burnett	253	....	253	Fair agricultural, mixed soil.
Chippewa	125	....	125	Broken.
Clark	120	....	120	Grazing, agricultural.
Columbia	5	....	5	Rolling, sandy.
Crawford	16	....	16	Agricultural, sandy.
Douglas	200	....	200	Fair agricultural.
Dunn	79	....	79	Agricultural.
Eau Claire	40	....	40	Fair agricultural, sandy loam.
Florence	120	....	120	Rough, hardwood.
Forest	83	....	83	Do.
Iron	40	....	40	Do.
Jackson	505	....	505	Rolling, soil mixed with loam.
Juneau	3	....	3	Agricultural, grazing.
La Crosse	82	....	82	Sandy soil.
Langlade	40	....	40	Hardwood, broken.
Lincoln	80	....	80	Fair agricultural.
Marinette	554	....	554	Agricultural, some sand.
Monroe	188	....	188	Agricultural, grazing, rolling.
Oneida	680	....	680	Rocky, sandy loam.
Price	451	....	451	Broken, some timbered.
Rusk	6	....	6	Broken, fair agricultural.
Sawyer	200	....	200	Some timbered, farming.
Taylor	40	....	40	Broken, soil second rate.
Trempealeau	80	....	80	Broken lands.
Vilas	6	....	6	Rough, hardwood.
Washburn	126	....	126	Agricultural, sandy clay.
Wood	42	....	42	Broken, some sandy.
State total	6,146	....	6,146	

WYOMING.

Buffalo:				
Big Horn	973,369	45,120	1,018,489	Grazing, agricultural, mountainous.
Campbell	415,072	....	415,072	Dry farming, grazing, rolling.
Converse	9,164	....	9,164	Grazing, hilly.
Hot Springs	166,365	....	166,365	Grazing, mountainous.
Johnson	1,198,058	....	1,198,058	Agricultural, dry farming, grazing mountainous.
Natrona	49,717	....	49,717	Dry lands, rolling, grazing.
Sheridan	206,924	22,840	229,764	Agricultural, grazing, dry farming.
Washakie	1,049,571	....	1,049,571	Grazing, mountainous.
Total	4,068,240	67,960	4,136,200	
Cheyenne:				
Albany	860,515	21,581	882,096	About one-half broken, mountainous; other half prairie, grazing, farming; farm land mostly along streams.
Carbon	1,883,529	10,701	1,894,230	Greater portion broken, mountainous, some timber, agricultural land along streams.
Fremont	149,251	32,979	182,230	Mountainous, arid, timber.
Goshen	143,940	3,360	147,300	Broken, grazing, dry farming.
Laramie	33,585	....	33,585	Prairie, broken, grazing, dry farming, lands along streams irrigable.
Platte	186,300	....	186,300	Prairie, broken, grazing, dry farming
Sweetwater	536,900	....	536,900	Mountainous, broken grazing, alkaline plains.
Total	3,794,020	68,621	3,862,641	
Douglas:				
Converse	486,594	30,130	516,724	Grazing, mountainous, mineral.
Fremont	946,270	....	946,270	Do.
Natrona	2,414,054	....	2,414,054	Do.
Niobrara	367,510	....	367,510	Do.
Total	4,214,428	30,130	4,244,558	

Statement showing the area of land unappropriated and unreserved on July 1, 1918—Con.

WYOMING—Continued.

Land district and county.	Area in acres.			Character.
	Surveyed.	Unsurveyed.	Total.	
Evanston:				
Fremont	547,054	583,337	1,130,391	Farming, grazing, mountainous.
Lincoln	1,377,720	570,602	1,948,322	Farming, grazing, timber.
Sweetwater	3,761,321	172,393	3,933,714	Dry farming, alkaline, grazing.
Uinta	583,970	....	583,970	Dry farming and grazing.
Total	6,270,065	1,326,332	7,596,397	
Lander:				
Big horn	168,870	....	168,870	Timber, mountainous, farming, and grazing.
Fremont	1,893,358	41,840	1,935,198	Arid, mountainous, farming, and grazing, some timber.
Hot Springs	692,199	40,116	732,315	Farming, grazing, mineral, and timber.
Park	857,151	8,034	865,185	Timber, stone, farming, grazing, some mineral.
Washakie	31,555	....	31,555	Broken, farming, grazing.
Total	3,643,133	89,991	3,733,124	
Sundance:				
Campbell	707,848	112,580	820,428	Broken, grazing.
Converse	21,165	....	21,165	Prairie, grazing.
Crook	347,720	143,069	490,789	Semimountainous lands.
Niobrara	21,402	....	21,402	Broken, grazing lands.
Weston	507,490	....	507,490	Timber, grazing.
Total	1,605,626	255,649	1,861,274	
State total	23,595,511	1,838,683	25,434,194	

RECAPITULATION BY STATES.

State.	Area in acres.		
	Surveyed.	Unsurveyed.	Total.
Alabama	35,220	....	35,220
Arizona	6,829,800	14,426,210	21,256,010
Arkansas	281,436	7,040	288,476
California	15,900,150	4,628,884	20,529,034
Colorado	8,441,461	1,830,494	10,271,955
Florida	114,726	....	114,726
Idaho	8,167,725	5,154,991	13,322,716
Kansas	5,275	....	5,275
Louisiana	33,649	11,910	45,559
Michigan	72,829	....	72,829
Minnesota	469,973	....	469,973
Mississippi	42,064	....	42,064
Missouri	147	....	147
Montana	3,335,963	4,865,066	8,201,029
Nebraska	105,909	2,647	108,556
Nevada	31,848,173	23,234,027	55,082,200
New Mexico	13,692,216	5,423,338	19,115,554
North Dakota	116,138	....	116,138
Oklahoma	31,715	....	31,715
Oregon	13,369,819	955,772	14,325,591
South Dakota	793,040	44,186	837,226
Utah	14,010,343	17,465,576	31,475,919
Washington	931,872	328,111	1,259,983
Wisconsin	6,146	....	6,146
Wyoming	23,595,511	1,838,683	25,434,194
Grand total	142,231,300	80,216,926	222,448,226

ALASKA.

The unappropriated lands in Alaska are not included herein. The total area of Alaska is 378,165,760 acres, of which about 23,884,000 acres are reserved. Approximately 1,006,762 acres have been surveyed under the rectangular system.

REPORT OF THE COMMISSIONER OF PENSIONS

COMMISSIONERS OF PENSIONS SINCE 1833.

Name.	By whom appointed.	Whence appointed.	Date of commission.
Edwards, James L	Jackson	Virginia	Mar. 3, 1833
Heath, James E	Fillmore	....do	Nov. 27, 1850
Waldo, Loren P	Pierce	Connecticut	Mar. 17, 1853
Minot, Josiah	....do	New Hampshire	Aug. 1, 1855
Whiting, George C	....do	Virginia	Jan. 19, 1857
Barrett, Joseph H	Lincoln	Ohio	Apr. 15, 1861
Cox, Christopher C	Johnson	Maryland	July 28, 1868
Van Aernam, Henry	Grant	New York	May 1, 1869
Baker, James H	....do	Minnesota	Apr. 20, 1871
Atkinson, Henry M	....do	Nebraska	Mar. 28, 1875
Gill, Charles R	....do	Wisconsin	Feb. 10, 1876
Bentley, John A	....do	....do	Mar. 28, 1876
Dudley, William W	Garfield	Indiana	June 27, 1881
Clarke, Otis P. G	Arthur	Rhode Island	Nov. 15, 1884
Black, John C	Cleveland	Illinois	Mar. 19, 1885
Tanner, James	Harrison	New York	Mar. 27, 1889
Raum, Green B	....do	Illinois	Oct. 19, 1889
Lochren, William	Cleveland	Minnesota	Apr. 13, 1893
Murphy, Dominic I	....do	Pennsylvania	May 28, 1896
Evans, Henry Clay	McKinley	Tennessee	Apr. 1, 1897
Ware, Eugene F	Roosevelt	Kansas	May 10, 1902
Warner, Vespasian	....do	Illinois	Mar. 4, 1905
Davenport, James L	Taft	New Hampshire	Nov. 28, 1909
Saltzgaber, Gaylord M	Wilson	Ohio	May 20, 1913

The Bureau of Pensions was organized as a bureau of the War Department under act of March 2, 1833 (4 Stat. L., 622). It became a bureau of the Interior Department when that department was established by the act of March 3, 1849 (9 Stat. L., 395).

REPORT OF THE COMMISSIONER OF PENSIONS.

WASHINGTON, D. C., *August 1, 1918.*

SIR: I have the honor to submit this annual report of the operations of the Bureau of Pensions for the fiscal year beginning July 1, 1917, and ending June 30, 1918.

GENERAL.

Statistical and financial information, usually sought for by committees and individuals of Congress and those of the public at large who feel an interest in the matters presented, is fully shown in the tables appended hereto. Each exhibit tells its story of the varied activities of the Pension Bureau.

To save others the necessity of making a painstaking search of the tables to procure knowledge of the matters most frequently inquired about, I have caused to be prepared and append herewith a statement of certain items concerning fiscal operations and important facts, as follows:

FISCAL OPERATIONS.

There were paid out the following amounts:

For pensions during the fiscal year:	
1917	$160,895,054
1918	179,835,329
For fees and expenses of examining surgeons:	
1917	35,627
1918	23,756
For field and special examinations:	
1917	79,503
1918	79,729
To pensioners in foreign countries:	
1917	929,768
1918	983,687

For the last six years the total cost for maintenance and expense of the pension system was as follows:

1913	$2,543,246
1914	2,066,507
1915	1,779,860
1916	1,656,722
1917	1,562,855
1918	1,527,615

INTERESTING FACTS AND FIGURES.

The following information regarding matters connected with the payment of pensions is of general interest:

Total pensioners on the roll June 30:		
1917		673, 111
1918		646, 895
Invalids	340, 313	
Widows	298, 035	
Dependents	4, 866	
Minors	2, 586	
Helpless children	932	
Nurses	163	
Civil War soldiers on the roll June 30:		
1917		329, 226
1918		296, 808
Civil War widows on the roll June 30:		
1917		284, 216
1918		288, 815
Number of deaths:		
Civil War soldiers—		
1917		33, 232
1918		30, 466
Widows, minor children, and dependents—		
1917		20, 130
1918		18, 412
The largest number of Civil War soldiers on the roll was in 1898		745, 822
The largest number of Civil War widows on the roll was in 1912		304, 373
War of 1812, widows surviving June 30, 1918		99
War with Mexico, June 30, 1918:		
Survivors		289
Widows		3, 064
War with Spain:		
Total number of original claims allowed by Pension Bureau		39, 694
Number on rolls June 30, 1918		27, 513
Changes of post-office addresses of pensioners:		
1917		130, 164
1918		128, 937
Employees at the beginning of the fiscal year:		
1917		1, 115
1918		1, 091
Volumes in military library:		
1917		1, 696
1918		1, 745
Total pieces of mail handled in 1918:		
Incoming		827, 262
Outgoing		3, 563, 696
Inclosures		1, 018, 187
Cases acted on under act of Mar. 3, 1899 (division of pension between husband and wife), 1918		2, 263
Cases acted on under act of Aug. 8, 1882 (to wife where husband is insane or imprisoned), 1918		82
Cases under guardianship, 1918		7, 964
Amount of fees paid to attorneys, 1918		$123, 291

Income, refundments, etc.:	
For addresses, certified copies, etc. (act Aug. 24, 1912)	$911.36
Refundments to pension appropriations	7,324.42
Miscellaneous	832.65
Total	9,068.43
Reimbursements:	
Amount allowed, expenses of last sickness and burial, for 1917	$226,982.56
Amount allowed, expenses of last sickness and burial, for 1918	$237,113.35
Medal-of-honor roll (act Apr. 27, 1916):	
Total number entered on roll	357

NEW PENSION LEGISLATION.

ACT OF OCTOBER 6, 1917.

INCREASED RATE OF $25 FOR CERTAIN WIDOWS.

Section 314 of what is known as the war-risk insurance act, approved October 6, 1917, reads as follows:

> SEC. 314. That from and after the passage of this Act the rate of pension for a widow of an officer or enlisted man of the Army, Navy, or Marine Corps of the United States who served in the Civil War, the War with Spain, or the Philippine Insurrection, now on the pension roll or hereafter to be placed on the pension roll, and entitled to receive a less rate than hereinafter provided, shall be $25 per month; and nothing herein shal be construed to affect the additional allowance provided by existing pension laws on account of a helpless child or child under sixteen years of age: *Provided, however*, That this Act shall not be so construed as to reduce any pension under any Act, public or private: *And provided further*, That the provisions of this section shall be administered, executed, and enforced by the Commissioner of Pensions.

There are now on the pension rolls, receiving the rate of $25 per month provided by this act, 283,515 widows of officers and men of the Civil War, and 1,093 widows of those who served in the War with Spain and the Philippine Insurrection, making a total of 284,608.

It will be observed that widows of those who served in the Regular Establishment, in the War of 1812, the War with Mexico, the various Indian wars, and the War of 1917 down to October 6, 1917, are not included unless the soldiers on account of whose service pension is claimed, rendered service also either in the Civil War, the War with Spain, or the Philippine Insurrection.

Neither are Army nurses, dependent parents or helpless children given the benefit of the increased rate of $25 per month provided by this act.

LIMITATION OF THE JURISDICTION OF THE PENSION BUREAU.

Section 312 of the act of October 6, 1917, contained a provision that existing pension laws should not be applicable after that date to persons then in, or thereafter entering, the military or naval service, or to their widows, children, or their dependents, except in so far as rights under any such law should have theretofore accrued.

An amendment to this section approved June 25, 1918, reads as follows:

> SEC. 312. That compensation under this article shall not be paid while the person is in receipt of service or retirement pay. The laws providing for gratuities or payments in the event of death in the service and existing pension laws shall not be applicable after the enactment of this amendment to any person in the active military or naval service on the sixth day of October, nineteen hundred and seventeen, or who thereafter entered the *active* military or naval service, or to their widows, children, or their dependents, except in so far as rights under any such law have heretofore accrued.

Under the provisions of section 312 as it was originally enacted, it was held by the Department of the Interior that the Pension Bureau had no jurisdiction of widows' claims based upon the service of officers and enlisted men who died subsequent to October 6, 1917, while they were borne upon the retired list of the Army or Navy.

The effect of section 312 as amended June 25, 1918, is to restore to the Pension Bureau jurisdiction in claims of this character which it had exercised prior to October 6, 1917, and it has been determined by the Secretary of the Interior that this renewal of jurisdiction takes effect from October 6, 1917, and that it is not necessary for the widow of a retired officer or enlisted man, who filed an application subsequent to October 6, 1917, to file another application to secure the benefits of the act of June 25, 1918.

All of the archives relating to claims for pension on account of the service of soldiers, sailors, and marines since the foundation of the Republic up to October 6, 1917, are on file in the Pension Bureau. These comprise the pension history of the Government in all its various forms. They also include the individual military and naval history of each claimant for pension and all the claims and personal narration of military history which are continually resorted to by descendants who are proud of the records of their ancestors, and this use is multiplying as time advances. There is in the Pension Bureau a voluminous and continuous record of pension matters without a break from the beginning.

The act of October 6, 1917, takes away from the Pension Bureau the jurisdiction of claims based upon service rendered on and after that date. In this act the bounty of the Government is referred to as "compensation" instead of "pension," but the purpose and meaning of the terms are the same.

Article III of this act provides for compensation "for death or disability," and section 312 provides that, as hereinbefore stated, existing pension laws shall not be applicable after October 6, 1917, to persons then in or thereafter entering the *active* service, "or to their widows, children, or their dependents, except in so far as rights under any such law shall have heretofore accrued."

ACT OF JUNE 10, 1918.

INCREASED RATES TO SOLDIERS OF THE CIVIL WAR.

The act of June 10, 1918, adds to the act of May 11, 1912, a new section, as follows:

> SEC. 6. That from and after the passage of this Act the rate of pension for any person who served ninety days or more in the military or naval service of the United States during the Civil War, now on the roll or hereafter to be placed on the pension roll and entitled to receive a less rate than hereinafter provided, shall be $30 per month. In case such a person has reached the age of seventy-two years and served six months, the rate shall be $32 per month; one year, $35 per month; one and a half years, $38 per month; two years or over, $40 per month: *Provided*, That this Act shall not be so construed as to reduce any pension under any Act, public or private: *Provided further*, That no pension attorney, claim agent, or other person, shall be entitled to receive any compensation for presenting any claim to the Bureau of Pensions under this Act, except in applications for original pension by persons who have not heretofore received a pension.

This legislation provides a minimum rate of $30 per month for all soldiers who served in the Civil War for a period of ninety days and were honorably discharged, and the maximum rate of $40 on account of age and service only to those who served two years or more and have attained the age of 72 years.

There were on the rolls at the date of the passage of this act 300,992 pensioners who served in the Civil War.

This act being mandatory in its terms, an earnest effort was made by the Pension Bureau to comply with its requirements at the earliest possible date. A large number of employees were detailed to form a section having charge exclusively of the work of allowing the increased rates provided for. Every division in the Pension Bureau was unusually diligent and active in aiding and carrying out this arrangement, and all employees with commendable energy have cooperated in doing all that could be done to secure to the pensioners as promptly as practicable the increased rates provided by law.

All pensioners on the roll are paid quarterly. The pensioners are, as required by law, divided into three groups, each group being paid once every three months, from which it results that a payment is made every month to one or the other of these groups.

The time intervening between the approval of the act of June 10, 1918, and July 4, 1918, date of next payment, was not sufficient to permit the payment of any of the increased rates on July 4, because the preparations for that payment had been already largely completed. Everything was, however, made ready for making each successive payment thereafter at the increased rates.

It will be noted that this act of June 10, 1918, was an amendment to the act of May 11, 1912. Those who had never been allowed pension under the act of May 11, 1912, and whose age and length of service had never been determined under that act, including those pensioned under what is known as the "general law," because of a wound or other disability incurred in the service, and those pensioned under special acts of Congress, were required to file a formal declaration under the act of May 11, 1912, in order to secure the benefits of the increased rates provided by the act of June 10, 1918.

SPECIAL ACTS OF CONGRESS.

During the year only one omnibus bill to grant pensions by special act of Congress was enacted into law. This act was approved June 8, 1918, and granted pension or increase of pension to 199 individuals.

PENSIONS SURRENDERED.

During the year there were 84 pensions voluntarily surrendered, a fact which is very unusual in the history of the Pension Bureau. It is interesting to note that in these cases 49 pensioners gave patriotic reasons—intention of reenlistment, or desire to help the Government, the Red Cross, or the Young Men's Christian Association; 9 stated that their disability had ceased; 1 widow pensioner said that she did not believe in war and refused to receive a war pension; another that her alleged helpless child had improved and could work; another, confronted with evidence that she had a husband living in Germany at the time of her marriage to the soldier, voluntarily surrendered her pension and refunded by check the full amount previously paid; 23 gave no reasons.

Beside the number above given there were 18 who again entered into the military service, and this fact created a presumption of the cessation of disability.

Many other pensions were discontinued for legal reasons such as usually occur, but a great many were peculiar because of the fact that discontinuance was on account of the present war.

FIELD EXAMINERS.

The Special Examination Division of the Pension Bureau has proven to be a very valuable arm of the service in uncovering fraud and determining the merits of claims. Its labors are worthy of the highest praise and it accomplishes good results. The mere fact of its existence deters malefactors from pursuing a predetermined purpose to defraud.

Methods which have retarded the work, or called for useless expenditure are thrown to the discard. Red tape no longer binds and it is doubtful whether there is any public service which gets better results for the money expended. The force, both in office and in the field, consists of men and women specially trained for this service. Investigations are now conducted in such a spirit of fairness, both to the Government and to pension claimants, that there is little criticism from any source.

By reason of an inadequate appropriation ($80,000), there was employed in the fiscal year ended June 30, 1918, an average force of but 49 special examiners, whereas the number of cases on hand justified the employment of 60 examiners with an expenditure of $96,000.

In estimating the fiscal requirements of the field service due consideration must be given to the additional work imposed by new legislation. Many of the most complicated claims under the act of September 8, 1916, require investigation. Moreover, the act of July 16, 1918, granting pensions, with dependence a determining factor, to the widows and minor children of officers and enlisted men who served in the war with Spain, the Philippine Insurrection, or in China, will develop numerous cases for special examination. It must also be remembered that the cost of subsistence and transportation has recently advanced at least 30 per cent. Congress should make an appropriation of $125,000 for the maintenance of the field service during the fiscal year 1920.

It will be noted that on July 1, 1917, there were 1,387 cases in process of special examination, while on June 30, 1918, the number of such cases had increased to 1,968. Now that the subsistence allowance has been increased to $4 per day the current appropriation is more inadequate.

In view of the fact that section 3 of the act of March 15, 1908 (30 Stat. 318), provides that books of reference for use at the seat of Government shall not be purchased unless specifically provided for in the appropriation, it is again suggested that allowance be made for an expenditure of not more than $100 for such books as railway and postal guides, pocket maps, business atlases, and directories. Such books of reference are essential to the efficient administration of the field service, and this suggestion is based on the fact that the amount allotted to this bureau from the library appropriation of the department is so trivial as to be practically useless when shared by the several divisions.

METAL BOXES FOR FILES.

The report for 1915 spoke at length of the great value of metal boxes which had been substituted for leather straps for holding the files of pension claims. Because of the importance of the subject and the desire to have an appropriation to procure a large number of boxes, mention is made of it here again.

There are over 2,000,000 of such files, all placed in the upper story of the Pension Building. A large number of them are held together by a leather strap, about 50 being included in one bundle. To have access to a single case it is necessary to unstrap the whole unwieldy bundle with great labor and to perform the same task on replacing the file. All this work is saved when the metal box is used.

I do not again state all of the reasons which are given in our report for 1915, to prove the vast superiority of the metal box over the leather strap, but the difference is very great. Because of recent legislation it was necessary to handle nearly the entire number of more than 650,000 cases on the pension roll in order to increase the pensions of the widows and latterly of the soldiers and sailors.

The increase to the widows was first to $20 and then to $25, so that the number of their files, amounting to over 200,000, was necessarily handled twice; altogether that would make nearly 900,000 times that it was necessary to have access to the files. This is all in addition to the number of times they are required to be handled in the ordinary business of the Pension Bureau.

For purposes of reference and historical use, after the occasion has ceased for pensionable purposes, it will be necessary to have access to the files with growing frequency. We think in the metal boxes the files will be more secure, freer from dust and danger from fire, and more easily accessible at all times.

ARCHITECTURE, PENSION BUILDING.

On February 26, 1917, the Pension Commissioner wrote to the Fine Arts Commission, Lemon Building, Washington, D. C., the following letter:

> Having in mind the almost universal desire to make Washington, the Capital city of the Nation, beautiful, artistically and otherwise, I thought it my duty to call to your attention the fact that many now regard the Pension Building as unsightly. I may say that this is, in my judgment, wholly because of the present form of the roof.
>
> As Gen. M. C. Meigs designed the building it was to have a rotunda, surmounted by a dome, in the center of it, and supported by the huge pillars that are there now and that were erected for that purpose.
>
> I beg leave to express my own opinion that the Pension Building has a handsome exterior, massive and grand. Having been here for years, I may say that the only criticism I have heard against the style of the building arises from the fact of the roof structure.
>
> As you are probably aware, the building is designed after the Farnese Palace in Rome, and, although tastes may differ, I have heard numerous expressions of admiration for the building itself.
>
> If there be a disposition on the part of the American Congress to listen to suggestions from gentlemen like yourselves, who are the most competent to judge, and to have some regard for permanent beauty in the construction and repair of the public buildings, I entertain and now express the hope that, when the time is propitious, you will make a recommendation which will cause the roof of the Pension Building to be reconstructed according to the original design.
>
> I might elaborate on the subject more in this letter, but have no doubt that the matter has hitherto been called to your attention, so it only remains for me to express my deference to your superior judgment, and to express the hope that something may be done to correct this one feature, which is the only thing lacking to make the building itself not only an edifice where public business may be carried on, but one that will win and deserve the admiration of all people who may behold it.

BACKING THE MEN IN THE TRENCHES.

The Pension Bureau employees have shown their patriotism in various ways. Few were of an age which would permit them to enter the service, yet the bureau has given 27 bright young men to battle for humanity and civilization.

The following figures show what the employees otherwise have done in support of the Government:

First Liberty loan:	
810 of 900 employees subscribed	$153,000
Second Liberty loan:	
836 of 1,041 employees subscribed	144,350
Third Liberty loan:	
843 of 982 employees subscribed	146,650

On the last day for subscriptions to the third Liberty loan, when the President called for a million citizens to "match" him in buying a $50 bond, the "follow-your-leader" spirit swept over the Pension Bureau, and 360 clerks responded.

The employees have invested more than $23,000 in war savings stamps.

Contributed to the Red Cross	$5,471
Young Men's Christian Association	685
Knights of Columbus	131
War Relief Bureau	1,457
Serbian Movable Hospital	60

In addition to these items, stipulated sums have been and are being given monthly to support the war activities presided over by Mrs. Franklin K. Lane. To other similar causes contributions have been cheerfully made.

CIVIL-SERVICE RETIREMENT.

The question of retirement of certain employees who have passed the age of usefulness is one that is frequently before Congress, and is ever present to the officials of this bureau.

We have a great number of employees who have served the bureau loyally for many years but who have now become physically less effective in the activities of the service. These people have generally been the supporters of families, and have been unable to make any provision for their latter years. It would be a heartless and inexcusable proceeding to dismiss these worn-out servants of the Government, and yet their continuance in the service is indefensible except on humanitarian grounds. Unless these people are to be summarily dismissed, the Government would be a gainer in a financial way by devising some retirement plan and the bureau would greatly profit in increased results by the elimination of the nonefficient class.

The argument favorable to civil service retirement draws much strength from conditions in the Pension Bureau.

The following statement shows the number, ages, and etc., of employees in the Pension Bureau on the 1st day of July, 1918:

Number in classified civil service	925
Age of oldest employee	87
Number over 80 years of age	24
Number between 70 and 80 years of age	168
Based on age of 70, number eligible for retirement	192
Percentage of all employees eligible for retirement	20.75

The average age of all employees in December, 1917, was 57 years.

WORK OF THE EMPLOYEES.

I close with a commendation of the faithful labors of the employees of the bureau. Although no additional help was given, the increase one time and then another to the hundreds of thousands of widows on the roll, and the increase to the hundreds of thousands of soldiers and sailors, largely and unusually multiplied the work of the bureau. All the employees responded with alacrity and zeal and gave to the beneficiaries of the generosity of the Government the added sums at the earliest time. All this was done in addition to their ordinary duties, which are always well performed to the extent of their ability.

Very respectfully,

G. M. SALTZGABER,
Commissioner.

The SECRETARY OF THE INTERIOR.

STATISTICAL TABLES.

EXHIBIT 1.—*Pensioners on the roll June 30, 1918, and June 30, 1917.*

Classes.	1918	1917	Gain.	Loss.
Regular Establishment:				
Invalids	15,233	15,702	....	469
Widows	2,953	2,962	....	9
Minor children	255	237	18	....
Mothers	1,228	1,209	19	....
Fathers	162	166	....	4
Brothers, sisters, sons, and daughters	7	7	....	....
Helpless children	5	5	....	....
Civil War:				
Act Feb. 6, 1907—				
Survivors	1,024	1,345	....	321
Act May 11, 1912—				
Survivors	266,443	291,268	....	24,825
General law—				
Invalids	30,920	36,076	....	5,156
Nurses	163	211	....	48
Widows	45,323	47,491	....	2,168
Minor children	100	119	....	19
Mothers	248	329	....	81
Fathers	18	27	....	9
Brothers, sisters, sons, and daughters	636	643	....	7
Helpless children	417	430	....	13
Act June 27, 1890—				
Invalids	421	537	....	116
Minor children	2,083	2,627	....	544
Helpless children	505	498	7	....
Act Apr. 19, 1908—				
Widows without children	240,661	234,069	6,592	....
Widows with children	2,831	2,656	175	....
War with Spain:				
Invalids	23,538	24,060	....	522
Widows	1,264	1,287	....	23
Minor children	147	159	....	12
Mothers	2,231	2,407	....	176
Fathers	326	355	....	29
Brothers, sisters, sons, and daughters	2	2	....	....
Helpless children	5	5	....	....
War of 1812:				
Widows	99	109	....	10
War with Mexico:				
Survivors	289	384	....	95
Widows	3,063	3,422	....	359
Brothers, sisters, sons, and daughters	1	....	1	....
Indian wars:				
Survivors	2,421	564	1,857	....
Widows	1,817	1,743	74	....
War of 1917:				
Invalids	24	....	24	....
Widows	24	....	24	....
Minor children	1	....	1	....
Mothers	7	....	7	....
Total	646,895	673,111	8,799	35,015
Net loss to the roll	....	....	....	26,216

DEATHS BY MONTHS.—*Statement showing loss to pension roll by death, July 1, 1917, to June 30, 1918.*

Months.	Invalids.		Widows, etc.		Total.
	Civil War.	Other classes.	Civil War.	Other classes.	
July	2,512	77	940	44	3,573
August	2,408	71	1,857	108	4,439
September	2,177	74	1,286	63	3,600
October	2,159	70	1,144	46	3,419
November	2,706	67	1,448	79	4,300
December	1,705	87	1,483	76	3,351
January	3,142	111	1,455	62	4,770
February	3,120	95	1,942	129	5,286
March	2,877	122	1,899	88	4,986
April	2,725	83	1,598	53	4,459
May	2,748	105	1,712	99	4,664
June	2,187	108	1,643	75	4,013
Total	30,466	1,065	18,412	917	50,860

EXHIBIT 2.—*Pensioners added to and dropped from the roll, the number on the roll at the beginning and at the close of the year, and the amount disbursed to each class of pensioners during the year ended June 30, 1918.*

Classes.	Number of pensioners beginning of year.	Gains to the roll.			Gains to classes, transfer from other classes.				Losses to the roll by—					Losses to classes.	Number of pensioners end of year.	Disbursements.
		Original.	Restoration.	Renewal.	Original.	Restoration.	Renewal.	Reissue.	Death.	Remarriage.	Limitation.	Failure to claim.	Other causes.			
Regular Establishment:																
Army—																
Invalids	11,491	412	3	4	1			3	353			11	160	360	11,030	$1,942,836.15
Widows, etc	2,957	198		3				2	113	40	18		2	8	2,979	663,095.31
Navy—																
Invalids	4,211	252	5	12	1				135			8	129	6	4,203	798,596.36
Widows, etc	1,629	93		1				2	54	24	6	2	1	7	1,631	371,518.61
Civil War:																
Act Feb. 6, 1907—																
Army	1,287	4						1	140			11	3	155	983	206,293.77
Navy	58								9			1		7	41	7,982.21
Act May 11, 1912—																
Army	282,157	180	3	54		1	20	1,658	25,658			90	34	86	258,205	77,904,792.55
Navy	9,111	22					1	25	914			3	2	2	8,238	2,389,458.13
General Law—																
Army—																
Invalids	35,585		1				32	1	3,634			8	2	1,474	30,511	11,964,835.06
Nurses	211	1	1						18					32	163	28,364.40
Widows, etc	48,310	67	3	1,498			20	6	3,725	48	21	7	10	37	46,056	12,575,620.75
Navy—																
Invalids	491			1			1		71			1		12	409	156,302.63
Widows, etc	729	3		24					66	2				2	686	196,073.64
Act June 27, 1890—																
Army—																
Invalids	500	3	2						44			8		67	391	66,219.11
Minors, etc	3,018	204	2	5					15		357	8	3	353	2,493	806,669.30
Navy—																
Invalids	37								6					1	30	4,302.60
Minors, etc	107	2	1								8		1	11	90	16,514.07
Act Apr. 19, 1908—																
Army widows	228,062	18,801	3	1,548	455		36	11	14,111	300		53	28	12	234,412	61,989,967.09
Navy widows	8,693	838		46	10		3		496	13		2			9,080	2,388,673.28
War with Spain:																
Army—																
Invalids	23,222	56	5	8					393			8	268	12	22,531	3,943,412.71
Widows, etc	3,984	73		4					167	66	34	7	7	72	3,708	712,425.08

Navy—																
Invalids	728	1							13			1	8		707	101,249.15
Widows, etc	231	2							8	3		1	1	3	217	47,042.17
War of 1812:																
Widows	109								10						99	21,118.12
War with Mexico:																
Survivors	384								95						289	116,383.00
Widows, etc	3,422	40	1	1					392	2		2		4	3,064	767,471.25
Indian wars:																
Survivors	564	1,599			437				159				19	1	2,421	644,756.07
Widows	1,743	255							173	5				3	1,817	295,160.34
War of 1917:																
Army—																
Invalids		11													11	1,319.17
Widows, etc		19													19	2,208.64
Navy—																
Invalids		13													13	1,362.73
Widows, etc		13													13	2,352.77
Total	673,111	23,252	30	3,209	904	1	113	1,709	50,860	523	434	222	668	2,727	646,895	179,835,328.75

Amount disbursed on account of Regular Establishment	$3,776,048.43
Amount disbursed on account of Civil War	170,409,262.45
Amount disbursed on account of War with Spain	3,805,129.09
Amount disbursed on account of War of 1812	21,118.12
Amount disbursed on account of War with Mexico	883,854.25
Amount disbursed on account of Indian wars	939,916.41
Amount disbursed on account of War of 1917	7,243.31

EXHIBIT 2A.—*Number of pensioners on the roll, by classes, at the close of the fiscal year ended June 30, 1918, and disbursements made during the year.*

Classes.	Number.	Disbursements.
Regular Establishment:		
Invalids	15,283	$2,741,494.52
Widows	2,953	770,430.12
Minor children	255	51,383.27
Dependent relatives	1,397	211,971.88
Helpless children	5	848.09
Civil War:		
Act Feb. 6, 1907—		
Survivors	1,024	214,375.98
Act May 11, 1912—		
Survivors	265,443	80,204,280.45
General law—		
Invalids	30,920	12,121,197.40
Nurses	163	25,304.40
Widows	46,323	12,540,881.29
Minor children	100	20,889.97
Dependent relatives	902	141,048.40
Helpless children	417	68,294.73
Act June 27, 1890—		
Invalids	421	79,431.71
Minor children	2,063	440,094.35
Helpless children	505	83,079.61
Act Apr. 19, 1908—		
Widows	243,492	64,378,048.52
War with Spain:		
Invalids	23,536	3,044,082.85
Widows	1,264	342,088.27
Minor children	147	31,417.85
Dependent relatives	2,559	385,425.40
Helpless children	5	1,088.52
War of 1812:		
Widows	99	21,118.12
War with Mexico:		
Survivors	289	116,383.65
Widows	3,063	787,314.85
Dependent relative	1	154.40
Indian wars:		
Survivors	2,421	644,756.07
Widows	1,817	385,169.34
War of 1917:		
Invalids	24	2,081.90
Widows	23	3,502.21
Minor children	1	(1)
Dependent relatives	8	1,062.29
Total	646,895	179,835,329.75

[1] No payment made.

Exhibit 3.—*Statement showing the number of pensioners in each class under the general pension laws and special acts of Congress, together with the annual value of each on the rolls at the close of the fiscal year ended June 30, 1918.*

Classes.	General laws.		Special acts.	
	Number.	Annual value.	Number.	Annual value.
Invalids, Regular Establishment	14,791	$2,473,230.54	442	$103,932.00
Widows, etc., Regular Establishment	4,128	834,504.00	482	171,748.00
Survivors, act Feb. 6, 1907	1,024	182,275.74		
Survivors, act May 11, 1912	266,443	77,331,356.16		
Invalids, general law, Civil War	19,052	6,900,531.00	11,868	4,303,554.00
Army nurses	118	16,992.00	45	8,412.00
Widows, etc., general law, Civil War	41,699	12,404,784.00	5,043	1,429,712.00
Invalids, act June 27, 1890	421	54,717.00		
Minors, etc., act June 27, 1890	2,588	429,816.00		
Widows, act Apr. 19, 1908	243,492	73,102,416.00		
Invalids, War with Spain	22,273	2,669,947.80	1,265	244,596.00
Widows, etc., War with Spain	3,656	717,216.00	319	78,816.00
Widows, War of 1812	90	18,144.00	9	2,400.00
Survivors, War with Mexico	274	97,740.00	15	6,144.00
Widows, etc., War with Mexico	2,893	613,920.00	171	37,812.00
Survivors, Indian wars	2,384	572,976.00	37	7,032.00
Widows, Indian wars	1,762	259,188.00	55	10,128.00
Invalids, War of 1917	24	5,268.00		
Widows, etc., War of 1917	32	7,224.00		
Total	627,144	178,692,246.24	19,751	6,404,286.00

Total number of pensioners	646,895
Total annual value	$185,088,120.24
Average annual value of each pension:	
All classes	286.12
Regular Establishment	180.59
Act Feb. 6, 1907	178.00
Act May 11, 1912	290.23
General law, Civil War	322.05
Act June 27, 1890	161.03
Act Apr. 19, 1908	300.22
War with Spain	134.87
Survivors, Civil War	297.09

Exhibit 4.—*Pensioners and amounts paid, arranged by States, Territories, insular possessions, Canal Zone, and foreign countries, during fiscal year ended June 30, 1918.*

	Number.	Amount.
STATES AND TERRITORIES.		
Alabama	2,552	$709,200.82
Alaska	63	17,507.77
Arizona	708	196,753.25
Arkansas	6,959	1,933,906.18
California	22,861	6,353,071.94
Colorado	6,369	1,769,945.10
Connecticut	7,905	2,196,799.53
Delaware	2,055	571,084.56
District of Columbia	7,101	2,023,367.90
Florida	4,018	1,116,602.27
Georgia	2,367	657,789.39
Idaho	1,772	492,438.11
Illinois	44,614	12,402,562.73
Indiana	38,481	10,693,869.90
Iowa	21,983	6,109,075.72
Kansas	25,588	7,110,905.23
Kentucky	16,871	4,688,450.90
Louisiana	4,243	1,179,129.74
Maine	11,269	3,131,655.18
Maryland	9,829	2,731,479.21
Massachusetts	26,956	7,491,072.44
Michigan	27,095	7,529,700.50
Minnesota	10,038	2,789,560.26
Mississippi	3,169	880,665.46
Missouri	31,187	8,666,867.30
Montana	1,871	519,950.95
Nebraska	11,351	3,154,442.99
Nevada	315	87,538.50
STATES AND TERRITORIES—continued.		
New Hampshire	5,183	$1,440,355.72
New Jersey	16,284	4,525,323.63
New Mexico	1,499	416,572.77
New York	54,022	15,062,713.84
North Carolina	2,870	797,573.00
North Dakota	2,316	646,616.44
Ohio	61,282	17,080,367.83
Oklahoma	9,005	2,502,489.57
Oregon	6,162	1,712,419.80
Pennsylvania	59,971	16,716,218.88
Rhode Island	3,542	984,321.72
South Carolina	1,339	372,108.13
South Dakota	4,261	1,184,131.98
Tennessee	13,397	3,723,026.33
Texas	6,639	1,844,978.56
Utah	811	225,376.91
Vermont	5,168	1,436,197.28
Virginia	6,881	1,912,229.96
Washington	7,867	2,186,239.33
West Virginia	8,363	2,324,477.35
Wisconsin	15,626	4,342,465.48
Wyoming	625	173,687.55
Total	642,703	178,815,285.89
Canal Zone	1	144.00

EXHIBIT 9.—*Comparative disbursements during each of the last five years, classified as to the character of pension received.*

	1918	1917	1916	1915	1914
DISABILITY PENSIONS.					
Civil War	$12,149,562.09	$13,444,481.48	$14,879,204.29	$16,562,903.96	$18,714,[illegible]
War with Spain	3,044,661.86	3,087,058.10	3,076,733.88	3,105,807.74	3,122,[illegible]
Regular Establishment	2,741,434.51	2,744,567.08	2,711,946.09	2,631,955.22	2,[illegible]
War of 1917	2,681.90				
Total	17,938,340.36	19,276,106.66	20,667,884.26	22,300,666.92	24,[illegible]
AGE AND SERVICE PENSIONS.					
Act of May 11, 1912	80,294,250.68	85,762,419.32	91,282,255.72	94,780,059.68	97,[illegible]
Act of Feb. 6, 1907	214,275.98	286,881.16	401,588.66	979,813.51	2,080,[illegible]
Act of June 27, 1890	70,421.71	87,968.85	123,573.85	248,228.23	512,[illegible]
War with Mexico	116,383.00	158,134.50	213,118.76	277,029.20	354,[illegible]
Indian wars	644,756.07	143,099.07	173,415.46	199,772.96	225,[illegible]
Total	81,340,087.44	86,438,502.90	92,193,952.45	96,484,903.58	100,[illegible]
DEPENDENTS.					
Civil War:					
General law	12,771,694.39	9,744,503.83	8,443,232.44	8,965,970.28	9,462,517.[illegible]
Act of June 27, 1890	523,173.37	651,779.91	755,514.49	776,115.84	838,[illegible]
Act of Apr. 19, 1908	64,378,640.92	42,192,544.02	34,546,384.04	34,355,679.96	34,340,[illegible]
Total	77,673,508.68	52,588,827.76	43,745,130.97	44,097,766.05	44,642,941.[illegible]
War with Spain	760,467.23	696,621.84	723,491.83	745,893.73	775,137.[illegible]
War of 1812	21,118.12	18,701.94	18,848.00	22,348.90	27,[illegible]
War with Mexico	767,471.25	683,920.80	890,161.78	648,817.40	706,[illegible]
Indian wars	295,160.34	270,898.31	301,656.48	313,933.22	334,[illegible]
Regular Establishment	1,034,613.92	921,473.64	913,964.15	908,936.34	893,[illegible]
War of 1917	4,561.41				
Total	80,556,900.95	55,180,444.29	46,593,253.21	46,732,695.64	47,379,[illegible]
Grand total	179,835,328.75	160,895,053.94	159,455,089.92	165,518,266.14	172,408,[illegible]

EXHIBIT 10.—*Amount paid to pensioners, 1790 to 1918, inclusive.*

War of the Revolution	$70,000,0[illegible]
War of 1812	46,031,[illegible]
Indian wars	15,144,212.[illegible]
War with Mexico	52,148,[illegible]
Civil War	5,087,647,618.[illegible]
War with Spain and Philippine Insurrection	61,[illegible],476.[illegible]
Regular Establishment	46,540,405.[illegible]
War of 1917	7,[illegible]
Unclassified	16,508,447.41
Total	5,[illegible],361,[illegible]

EXHIBIT 6.—*Comparative table of disbursements of pensions on account of the different wars for the last 5 fiscal years (cents omitted).*

	1918	1917	1916	1915	1914
Civil War	$170,402,020	$152,170,579	$150,431,753	$156,668,771	$163,377,552
War with Spain	3,805,129	3,783,680	3,800,226	3,851,701	3,907,510
War of 1812	21,118	18,702	18,848	22,349	27,532
War with Mexico	883,854	842,055	803,281	925,847	1,060,530
Indian wars	939,916	413,997	475,072	513,706	560,247
Regular Establishment	3,776,049	3,666,041	3,625,910	3,535,892	3,475,147
War of 1917	7,243	....	....	....	....
Total	179,835,329	160,895,054	159,155,090	165,518,266	172,408,518

EXHIBIT 7.—*Comparative table of the value of an average pension of the different wars for the last 5 fiscal years.*

	1918	1917	1916	1915	1914
Civil War	$287.95	$247.71	$230.01	$226.58	$224.38
War with Spain	138.30	133.81	133.47	133.22	135.16
War of 1812	213.31	171.58	163.80	166.71	161.95
War with Mexico	263.60	221.24	186.89	187.68	189.65
Indian wars	221.78	179.44	184.27	181.39	180.89
Regular Establishment	190.30	180.69	180.37	179.21	179.67
Average for all wars	278.00	242.00	224.29	179.12	178.62

EXHIBIT 8.—*Comparative number of pensioners on the roll at the close of each of the last five fiscal years, classified as to the character of pension received.*

	1918	1917	1916	1915	1914
DISABILITY PENSIONS.					
Civil War	31,083	36,287	39,845	45,611	50,347
War with Spain	23,538	24,060	24,101	24,370	24,250
Regular Establishment	15,233	15,702	15,553	15,242	14,919
War of 1917	24	....	....	....	....
Total	69,878	76,049	79,499	85,223	89,516
AGE AND SERVICE PENSIONS.					
Act May 11, 1912	266,443	291,268	320,276	347,081	369,624
Act Feb. 6, 1907	1,024	1,345	1,727	2,872	7,158
Act June 27, 1890	421	537	681	1,081	2,225
War with Mexico	289	384	513	680	893
Indian wars	2,421	564	676	786	915
Total	270,598	294,098	323,873	352,500	380,815
DEPENDENTS.					
Civil War:					
General Law	46,742	49,039	52,217	56,020	59,160
Act June 27, 1890	2,588	3,125	3,725	3,854	4,091
Act Apr. 19, 1908	243,492	236,725	235,536	235,087	235.524
Total	292,822	288,889	291,478	294,961	298,775
War with Spain	3,975	4,215	4,371	4,542	4,660
War of 1812	99	109	115	134	170
War with Mexico	3,064	3,422	3,785	4,253	4,699
Indian wars	1,817	1,743	1,902	2,046	2,182
Regular Establishment	4,610	4,586	4,549	4,488	4,422
War of 1917	32	....	....	....	....
Total	306,419	302,964	306,200	310,424	314,908
Grand total	646,895	673,111	709,572	748,147	785,239

Exhibit 9.—*Comparative disbursements during each of the last five years, classified as to the character of pension received.*

	1918	1917	1916	1915	1914
DISABILITY PENSIONS.					
Civil War	$12,149,562.09	$13,444,481.48	$14,879,204.29	$16,562,903.96	$18,714,[illegible]
War with Spain	3,044,661.86	3,087,058.10	3,076,733.88	3,105,807.74	3,122,372.[illegible]
Regular Establishment	2,741,434.51	2,744,567.08	2,711,946.09	2,631,955.22	2,581,[illegible]
War of 1917	2,681.90				
Total	17,938,340.36	19,276,106.66	20,667,884.26	22,300,666.92	24,4[illegible]
AGE AND SERVICE PENSIONS.					
Act of May 11, 1912	80,294,250.68	85,762,419.32	91,282,255.72	94,780,069.65	97,[illegible]
Act of Feb. 6, 1907	214,275.98	286,881.16	401,588.66	979,813.51	2,000,[illegible]
Act of June 27, 1890	70,421.71	87,968.85	123,573.85	248,228.23	512,901.47
War with Mexico	116,383.00	158,134.59	213,118.76	277,020.20	254,788.79
Indian wars	644,756.07	143,099.07	173,415.46	199,772.96	225,664.[illegible]
Total	81,340,087.44	86,438,502.99	92,193,952.45	96,484,903.58	100,600,119.[illegible]
DEPENDENTS.					
Civil War:					
General law	12,771,694.39	9,744,503.83	8,443,232.44	8,965,970.28	9,462,517.57
Act of June 27, 1890	523,173.37	651,779.91	755,514.49	776,115.84	838,[illegible]
Act of Apr. 19, 1908	64,378,640.92	42,192,544.02	34,546,384.04	34,355,679.93	34,340,[illegible]
Total	77,673,508.68	52,588,827.76	43,745,130.97	44,097,766.06	44,642,941.[illegible]
War with Spain	760,467.23	696,621.84	723,491.83	745,893.73	775,137.[illegible]
War of 1812	21,118.12	18,701.94	18,848.00	22,348.90	27,[illegible]
War with Mexico	767,471.25	683,920.80	590,161.78	648,817.40	706,729.95
Indian wars	295,160.34	270,898.31	301,656.48	313,933.22	324,[illegible]
Regular Establishment	1,034,613.92	921,473.64	913,964.15	903,936.34	893,957.[illegible]
War of 1917	4,561.41				
Total	80,556,900.96	55,180,444.29	46,293,253.21	46,732,695.64	47,379,880.[illegible]
Grand total	179,835,328.75	160,895,053.94	159,155,089.92	165,518,266.14	172,408,518.[illegible]

Exhibit 10.—*Amount paid to pensioners, 1790 to 1918, inclusive.*

War of the Revolution	$70,000,000.00
War of 1812	46,031,[illegible]
Indian wars	15,144,212.[illegible]
War with Mexico	52,148,128.[illegible]
Civil War	5,087,647,615.[illegible]
War with Spain and Philippine Insurrection	61,333,478.[illegible]
Regular Establishment	46,540,405.[illegible]
War of 1917	7,243.31
Unclassified	16,508,447.41
Total	5,395,361,108.[illegible]

EXHIBIT 11.—*Disbursements for pensions and for maintenance of pension system, 1866 to 1918.*

Fiscal year.	Paid as pensions.	Cost, maintenance, and expenses.	Total.	Number of pensioners.
1866	$15,450,549.88	$407,165.00	$15,857,714.88	126,722
1867	20,784,789.69	490,977.35	21,275,767.04	155,474
1868	23,101,509.36	553,020.34	23,654,529.70	169,643
1869	28,513,247.27	564,526.81	29,077,774.08	187,963
1870	29,351,488.78	600,997.86	29,952,486.64	198,686
1871	28,518,792.62	863,079.00	29,381,871.62	207,495
1872	29,752,746.81	951,253.00	30,703,999.81	232,229
1873	26,982,063.89	1,003,200.64	27,985,264.53	238,411
1874	30,206,778.99	966,794.13	31,173,573.12	236,241
1875	29,270,404.76	982,695.35	30,253,100.11	234,821
1876	27,936,209.53	1,015,078.81	28,951,288.34	232,137
1877	28,182,821.72	1,034,459.33	29,217,281.05	232,104
1878	26,786,009.44	1,032,500.09	27,818,509.53	223,998
1879	33,664,428.92	837,734.14	34,502,163.06	242,755
1880	56,689,229.08	935,027.28	57,624,256.36	250,802
1881	50,583,405.35	1,072,059.64	51,655,464.99	268,830
1882	54,313,172.05	1,466,236.01	55,779,408.06	285,697
1883	60,427,573.81	2,591,648.29	63,019,222.10	303,658
1884	57,912,387.47	2,835,181.00	60,747,568.47	322,756
1885	65,171,937.12	3,392,576.34	68,564,513.46	345,125
1886	64,091,142.90	3,245,016.61	67,336,159.51	365,783
1887	73,752,997.08	3,753,400.91	77,506,397.99	406,007
1888	78,950,501.67	3,515,057.27	82,465,558.94	452,557
1889	88,842,720.58	3,466,968.40	92,309,688.98	489,725
1890	106,093,850.39	3,526,382.13	109,620,232.52	537,944
1891	117,312,690.50	4,700,636.44	122,013,326.94	676,160
1892	139,394,147.11	4,898,665.80	144,292,812.91	876,068
1893	156,906,637.94	4,867,734.42	161,774,372.36	966,012
1894	139,986,726.17	3,963,976.31	143,950,702.48	969,544
1895	139,812,294.30	4,338,020.21	144,150,314.51	970,524
1896	138,220,704.46	3,991,375.61	142,212,080.07	970,678
1897	139,949,717.35	3,987,783.07	143,937,500.42	976,014
1898	144,651,879.80	4,114,091.46	148,765,971.26	993,714
1899	138,355,052.95	4,147,517.73	142,502,570.68	991,519
1900	138,462,130.65	3,841,706.74	142,303,887.39	993,592
1901	138,531,483.84	3,868,795.44	142,400,279.28	997,735
1902	137,504,267.99	3,831,378.96	141,335,646.95	999,446
1903	137,759,653.71	3,993,216.79	141,752,870.50	996,545
1904	141,093,571.49	3,849,366.25	144,942,937.74	994,762
1905	141,142,861.33	3,721,832.82	144,864,694.15	998,441
1906	139,000,288.25	3,523,269.51	142,523,557.76	985,971
1907	138,155,412.46	3,309,110.44	141,464,522.90	967,371
1908	153,093,086.27	2,800,963.36	155,894,049.63	951,687
1909	161,973,703.77	2,852,583.73	164,826,287.50	946,194
1910	159,974,056.08	2,657,673.86	162,631,729.94	921,083
1911	157,325,160.35	2,517,127.06	159,842,287.41	892,098
1912	152,986,433.72	2,448,857.31	155,435,291.03	860,294
1913	174,171,660.80	2,543,246.59	176,714,907.39	820,200
1914	172,417,546.26	2,066,507.15	174,484,053.41	785,239
1915	165,518,266.14	1,779,860.30	167,298,126.44	748,147
1916	159,155,089.92	1,656,722.33	160,811,812.25	709,572
1917	160,895,053.94	1,562,854.96	162,457,908.90	673,111
1918	179,835,328.75	1,527,615.61	181,362,944.36	646,895
Total	5,298,915,665.46	134,465,525.99	5,433,381,191.45	....

Exhibit 12.—*Loss and percentage of loss by death of Civil War soldiers, 1910 to 1918.*

Year.	On roll at beginning of year.	Loss by death during year.	Percentage of loss.
1910	593,961	35,312	5.9
1911	562,615	35,243	6.2
1912	529,881	33,981	6.3
1913	497,263	36,064	7.2
1914	462,379	33,639	7.3
1915	429,354	33,255	7.7
1916	396,370	34,252	8.6
1917	362,277	33,232	9.2
1918	329,226	30,466	9.3

Exhibit 13.—*Comparative table of losses and gains to the roll for the last 5 years classified by causes.*

	1918	1917	1916	1915	1914
Losses:					
By death	50,860	54,526	55,463	52,329	52,583
By remarriage	523	549	740	608	751
Minors attaining age of 16 years	434	545	623	715	773
Failure to claim for 3 years	222	258	702	627	248
Other causes	668	353	266	201	226
Total	52,707	56,231	57,794	54,480	54,581
Gains:					
By original allowance	23,252	18,496	18,929	17,064	19,198
Restoration and renewal	3,239	1,274	290	324	350
Total	26,491	19,770	19,219	17,388	19,548
Net loss	26,216	36,461	38,575	37,092	35,033

Exhibit 14.—*Comparative table of losses and gains to the rolls for the last 5 fiscal years, classified by wars.*

	1918				1917				1916				1915				1914			
	Losses.	Gains.	Net loss.	Net gain.	Losses.	Gains.	Net loss.	Net gain.	Losses.	Gains.	Net loss.	Net gain.	Losses.	Gains.	Net loss.	Net gain.	Losses.	Gains.	Net loss.	Net gain.
Regular establishment:																				
Army invalids	884	423	461		457	538		81	454	524		70	386	556		170	413	572		159
Army dependents	181	203		22	255	294		39	179	184		5	163	201		38	174	174		
Navy invalids	278	270	8		190	258		68	212	453		241	168	336		168	201	400		199
Navy dependents	94	96		2	120	118	2		75	131		56	84	110		26	77	102		25
Civil War:																				
Act May 11, 1912—																				
Army	25,868	1,916	23,952		29,681	1,702	27,979		29,257	3,342	25,915		27,151	445	26,706		26,843	17,857	8,986	
Navy	921	48	873		1,080	51	1,029		1,044	154	890		1,027	46	981		1,052	598	454	
Act Feb. 6, 1907—																				
Army	309	5	304		389	27	362		1,088	25	1,063		768	43	725		8,863	145	8,718	
Navy	17		17		22	2	20		86	4	82		47	3	44		408	43	365	
General law—																				
Army invalids	5,108	34	5,074		5,162	1,677	3,485		6,260	583	5,677		4,325	27	4,298		11,719	370	11,349	
Army nurses	50	2	48		41		41		23		23		20	3	17		34	1	33	
Army dependents	3,848	1,594	2,254		4,284	1,145	3,139		4,646	879	3,767		4,293	894	3,399		4,458	780	3,678	
Navy invalids	84	2	82		71	39	32		79	13	66		61	3	58		112	8	104	
Navy dependents	70	27	43		74	35	39		53	17	36		71	24	47		54	9	45	
Act June 27, 1890—																				
Army invalids	114	5	109		150	12	138		371	10	361		181	14	167		2,900	41	2,859	
Army dependents	731	211	520		847	261	586		571	445	126		612	394	218		657	473	184	
Navy invalids	7		7		6		6		39		39		24	1	23		193	3	190	
Navy dependents	20	3	17		41	27	14		20	17	3		31	11	20		27	22	5	
Act Apr. 19, 1908—																				
Army widows	14,564	20,944		6,380	15,369	16,631		1,262	15,052	15,518		466	12,812	13,079		267	12,488	15,166		2,678
Navy widows	510	897		387	626	553	73		536	519	17		515	412	103		493	475	18	
War with Spain:																				
Army invalids	570	69	501		502	462	40		387	123	264		342	467		125	290	383		93
Army dependents	303	77	226		272	127	145		268	105	163		264	154	110		320	137	183	
Navy invalids	22	1	21		11	10	1		12	7	5		16	12	4		17	14	3	
Navy dependents	16	2	14		16	5	11		15	7	8		14	7	7		17	5	12	
War of 1812:																				
Widows	10		10		9	3	6		19		19		36		36		29		29	
War with Mexico:																				
Survivors	95		95		134	5	129		168	1	167		212		212		256	7	249	
Widows	400	42	358		408	45	363		544	76	468		520	74	446		509	85	424	
Indian wars:																				
Survivors	179	2,036		1,857	114	2	112		114	4	110		135	6	129		159	8	151	
Widows	181	255		74	201	42	159		205	61	144		202	66	136		209	61	148	

Exhibit 12.—*Loss and percentage of loss by death of Civil War soldiers, 1910 to 1918.*

Year.	On roll at beginning of year.	Loss by death during year.	Percentage of loss.
1910	593,961	35,312	5.9
1911	562,615	35,243	6.3
1912	520,881	32,951	6.3
1913	497,263	36,064	7.2
1914	462,379	33,639	7.3
1915	420,354	32,256	7.7
1916	396,370	34,252	8.6
1917	362,277	33,222	9.2
1918	329,226	30,466	9.3

Exhibit 13.—*Comparative table of losses and gains to the roll for the last 5 years classified by causes.*

	1918	1917	1916	1915	1914
Losses:					
By death	50,860	54,526	55,463	52,329	52,401
By remarriage	523	549	740	608	731
Minors attaining age of 16 years	434	545	623	715	773
Failure to claim for 3 years	222	258	702	627	248
Other causes	668	353	266	201	228
Total	52,707	56,231	57,794	54,480	54,381
Gains:					
By original allowance	23,252	18,496	18,929	17,064	19,107
Restoration and renewal	3,239	1,274	290	324	239
Total	26,491	19,770	19,219	17,388	19,346
Net loss	26,216	36,461	38,575	37,092	35,035

EXHIBIT 14.—*Comparative table of losses and gains to the rolls for the last 5 fiscal years, classified by wars.*

	1918				1917				1916				1915				1914			
	Losses.	Gains.	Net loss.	Net gain.	Losses.	Gains.	Net loss.	Net gain.	Losses.	Gains.	Net loss.	Net gain.	Losses.	Gains.	Net loss.	Net gain.	Losses.	Gains.	Net loss.	Net gain.
Regular establishment:																				
Army invalids	884	423	461		457	538		81	454	524		70	386	556		170	413	572		159
Army dependents	181	203		22	255	294		39	179	184		5	163	201		38	174	174		
Navy invalids	278	270	8		190	258		68	212	453		241	168	336		168	201	400		199
Navy dependents	94	96		2	120	118	2		75	131		56	81	110		26	77	102		25
Civil War:																				
Act May 11, 1912—																				
Army	25,868	1,916	23,952		29,681	1,702	27,979		29,257	3,342	25,915		27,151	445	26,706		26,843	17,857	8,986	
Navy	921	48	873		1,080	51	1,029		1,044	154	890		1,027	46	981		1,052	598	454	
Act Feb. 6, 1907—																				
Army	309	5	304		389	27	362		1,088	25	1,063		768	43	725		8,863	145	8,718	
Navy	17		17		22	2	20		86	4	82		47	3	44		408	43	365	
General law—																				
Army invalids	5,108	34	5,074		5,162	1,677	3,485		6,260	583	5,677		4,325	27	4,298		11,719	370	11,349	
Army nurses	50	2	48		41		41		23		23		20	3	17		34	1	33	
Army dependents	3,848	1,594	2,254		4,284	1,145	3,139		4,646	879	3,767		4,293	894	3,399		4,458	780	3,678	
Navy invalids	84	2	82		71	39	32		79	13	66		61	3	58		112	8	104	
Navy dependents	70	27	43		74	35	39		53	17	36		71	24	47		54	9	45	
Act June 27, 1890—																				
Army invalids	114	5	109		150	12	138		371	10	361		181	14	167		2,900	41	2,859	
Army dependents	731	211	520		847	261	586		571	445	126		612	394	218		657	473	184	
Navy invalids	7		7		6		6		39		39		24	1	23		193	3	190	
Navy dependents	20	3	17		41	27	14		20	17	3		31	11	20		27	22	5	
Act Apr. 19, 1908—																				
Army widows	14,564	20,944		6,380	15,369	16,631		1,262	15,052	15,518		466	12,812	13,079		267	12,488	15,166		2,678
Navy widows	510	897		387	626	553	73		536	519	17		515	412	103		493	475	18	
War with Spain:																				
Army invalids	570	69	501		502	462	40		387	123	264		342	467		125	290	383		93
Army dependents	303	77	226		272	127	145		268	105	163		264	154	110		320	137	183	
Navy invalids	22	1	21		11	10	1		12	7	5		16	12	4		17	14	3	
Navy dependents	16	2	14		16	5	11		15	7	8		14	7	7		17	5	12	
War of 1812:																				
Widows	10		10		9	3	6		19		19		36		36		29		29	
War with Mexico:																				
Survivors	95		95		134	5	129		168	1	167		212		212		256	7	249	
Widows	400	42	358		408	45	363		544	76	468		520	74	446		509	85	424	
Indian wars:																				
Survivors	179	2,036		1,857	114	2	112		114	4	110		135	6	129		159	8	151	
Widows	181	255		74	201	42	159		205	61	144		202	66	136		209	61	148	

EXHIBIT 14.—*Comparative table of losses and gains to the rolls for the last 5 fiscal years, classified by wars*—Continued.

	1918				1917				1916				1915				1914			
	Losses.	Gains.	Net loss.	Net gain.	Losses.	Gains.	Net loss.	Net gain.	Losses.	Gains.	Net loss.	Net gain.	Losses.	Gains.	Net loss.	Net gain.	Losses.	Gains.	Net loss.	Net gain.
War of 1917:																				
Army invalids	....	11	......	11	....	....	......	......	....	....	......	......	....	....	......	......	....	....	......	......
Army dependents	....	19	......	19	....	....	......	......	....	....	......	......	....	....	......	......	....	....	......	......
Navy invalids	....	13	......	13	....	....	......	......	....	....	......	......	....	....	......	......	....	....	......	......
Navy dependents	....	13	......	13	....	....	......	......	....	....	......	......	....	....	......	......	....	....	......	......
Total	55,434	29,218	26,216	......	60,532	24,071	36,461	......	61,777	23,202	38,575	......	54,480	17,388	37,092	......	72,972	37,939	35,033	......

EXHIBIT 15.—*Appropriations for pensions and disbursements on account thereof for the fiscal year ended June 30, 1918, and unexpended balances at close of year.*

	Pensions.			Fees of examining surgeons, pensions.
	Army.	Navy.	Total.	
APPROPRIATIONS.				
Act of Mar. 3, 1917	$153,800,000.00	$6,200,000.00	$160,000,000.00	$60,000.00
Deficiency act of Mar. 28, 1918	22,400,000.00	600,000.00	23,000,000.00	
Repayments to the appropriation	72,178.62	4,622.03	76,800.65	
Total to be accounted for	176,272,178.62	6,804,622.03	183,076,800.65	60,000.00
DISBURSEMENTS.				
Amount disbursed by disbursing clerk, Bureau of Pensions	173,353,938.45	6,481,390.30	179,835,328.75	
Amount disbursed by chief disbursing clerk, Department of the Interior				23,755.93
Total amount disbursed	173,353,938.45	6,481,390.30	179,835,328.75	23,755.93
BALANCES JUNE 30, 1918.				
Balance deposited by disbursing clerk, Bureau of Pensions	1,248,240.17	118,231.73	1,366,471.90	
Remaining in the hands of chief disbursing clerk, Department of the Interior				2,244.07
Remaining in the United States Treasury	1,670,000.00	205,000.00	1,875,000.00	34,000.00
Available balance	2,918,240.17	323,231.73	3,241,471.90	36,244.07
Total accounted for	176,272,178.62	6,804,622.03	183,076,800.65	60,000.00

In addition to the above there were disbursed during the fiscal year ended June 30, 1918, the following sums chargeable to the appropriation for the fiscal year ended June 30, 1917:

Fees of examining surgeons, pensions, by chief disbursing clerk, Department of the Interior	$12,461.90
Fees of examining surgeons, pensions, by Treasury settlements	133.00
Total	12,594.90

Of the amount, $6,481,390.30, disbursed for Navy pensions, $542,596.77 was paid from the Navy pension fund.

EXHIBIT 16.—*Number and amount of first payments in original, increase, restoration, and other cases made during fiscal year ended June 30, 1918.*

Class.	Original.		Increase and reissue.		Supplemental.		Restoration and renewal.		Total.	
	Number.	Amount.	Number.	Amount.	Number.	Amount.	Number.	Amount.	Number.	Amount.
Regular Establishment:										
Army—										
Invalids	423	$58,538.65	187	$6,361.17			5	$704.73	615	$65,604.55
Widows, etc	195	38,606.08	312	7,416.11			4	251.66	511	46,273.85
Navy—										
Invalids	280	36,658.21	61	2,365.78	1	$56.60	20	1,214.55	362	40,295.14
Widows, etc	90	16,562.48	114	2,252.21			1	324.13	205	19,138.82
Civil War:										
Act Feb. 6, 1907—										
Army	4	2,357.60							4	2,357.60
Navy										
Act May 11, 1912—										
Army	191	61,402.39	39,205	2,467,301.91			103	11,406.66	39,499	2,540,110.96
Navy			1,241	84,039.55			3	178.53	1,244	84,218.08
General law—										
Army—										
Invalids	1	51.80	142	8,415.97			5	501.34	148	8,969.11
Nurses	1	151.20							1	151.20
Widows, etc	81	19,306.59	2,462	159,879.63			1,367	299,896.02	3,910	479,082.24
Navy—										
Invalids	1	318.13	3	207.00			1	300.00	5	825.13
Widows, etc	7	1,730.50	178	2,303.56			29	4,963.18	214	8,997.24
Act June 27, 1890—										
Army—										
Invalids	5	2,504.47	2	778.53	2	2,987.47	1	1,649.16	10	7,919.63
Minors and helpless children	199	56,048.47					4	472.92	203	56,521.39
Navy—										
Invalids										
Minors and helpless children	5	1,548.00							5	1,548.00
Act Apr. 19, 1908—										
Army widows	18,968	3,126,639.49	11,998	660,671.00	4	4,200.77	1,598	292,575.01	32,568	4,084,086.27
Navy widows	882	107,371.19	320	16,704.68	1	2,411.87	45	5,906.44	1,248	132,394.18
War with Spain:										
Army—										
Invalids	67	31,076.12	120	4,838.33			13	2,974.55	200	38,889.00
Widows, etc	77	17,192.07	123	6,383.31			3	261.13	203	23,836.51
Navy—										
Invalids	2	1,798.88	5	124.88					7	1,923.76
Widows, etc	1	1,049.53	23	404.90					24	1,454.43

EXHIBIT 18.—*Certificates issued during the fiscal year ended June 30, 1918.*

Classes.	Original.	Increase.	Reissue.	Restoration.	Renewal.	Supplemental.	Total.
General law:							
Civil War, Army—							
Invalids		126	14	1	36	3	180
Nurses	1						1
Widows, etc	75	1	19	3	20	1	119
Civil War, Navy—							
Invalids		2	2		2		6
Widows, etc	1		2				3
War with Spain, Army—							
Invalids	57	134	14	5	8		218
Widows, etc	73		1		6		80
War with Spain, Navy—							
Invalids	1	3	1				5
Widows, etc	2						2
Regular Establishment, Army—							
Invalids	411	174	31	1	5		622
Widows, etc	203		9		1		213
Regular Establishment, Navy[a]—							
Invalids	273	50	36	6	27	1	393
Widows, etc	91	1	1				93
War of 1917, Army—							
Invalids	10						10
Widows, etc	19		1				20
War of 1917, Navy—							
Invalids	14						14
Widows, etc	13						13
Act of June 27, 1890:							
Civil War, Army—							
Invalids	4			2		3	9
Widows, etc	217		5	4	8	3	237
Civil War, Navy—							
Invalids							
Widows, etc	3					1	4
Act of Feb. 6, 1907:							
Civil War, Army—Soldiers	5		4	1			10
Civil War, Navy—Sailors							
Mexican War—Survivors							
Act of Apr. 19, 1908:							
Civil War, Army—Widows	662	1	19	1	18	1	702
Civil War, Navy—Widows	37				1		38
Act of May 11, 1912:							
Civil War, Army—Soldiers	186	10,524	2,046	2	84	2	12,844
Civil War, Navy—Sailors	22	205	29		1		257
Mexican War—Survivors							
Act of Apr. 19, 1908, amended by act of Sept. 8, 1916:							
Civil War, Army—Widows	17,150	1	11	1	24		17,187
Civil War, Navy—Widows	746	1			1		748
Act of Sept. 8, 1916, sec. 2:							
Civil War, Army—Former widows	1,498		6		3,038		4,542
Civil War, Navy—Former widows	52				78		130
Act of Jan. 29, 1887, etc.:							
Mexican War—							
Survivors							
Widows	39						39
Act of Sept. 8, 1916, Mexican War, widow					1		1
Act of July 27, 1892, etc.:							
Indian Wars—							
Survivors	3	4					
Widows	30						30
Act of Mar. 4, 1917:							
Indian wars—							
Survivors	2,029		2				2,031
Widows	226						226
Total	24,153	11,227	2,253	27	3,359	15	41,034
Reissues in lieu of lost certificates							1,545
Accrued pension orders							16,047
Widows' increase orders, act Sept. 8, 1916							8,348
Grand total							66,974

[a] Concurrent originals, 25.

EXHIBIT 19.—*Statement showing by classes the different monthly rates paid to pensioners under the general pension laws and the number at each rate on the roll June 30, 1918.*

Rate.	Regular Establishments.		Civil War.							War with Spain.	
	Invalids.	Widows, etc.	Act May 11, 1912.	Act Feb. 6, 1907.	General law.		Act June 27, 1890.		Act Apr. 19, 1908.	Invalids.	Widows, etc.
					Invalids.	Widows, etc.	Invalids.	Minors, etc.	Widows.		
$2.00	2	2						1			1
2.50	1										
3.00	7										
4.00	5										
5.00	10										
6.00	4,082				203		24			9,182	
6.25										4	
7.50	14				3					20	
8.00	2,147				114	1	65	1		4,081	
8.50										22	
9.00	2										
9.50	1										
10.00	1,488				92		47			2,679	
10.50	1										
11.00	2										
11.25					1					23	
11.50	2										
12.00	1,655	2,690		589	168	762	284	2,586		2,342	2,5[illegible]
12.50	13				1					10	
12.75	1				3					36	
13.00	1		156		4					1	
13.50			329								
14.00	638		222		169					886	
14.50			162							1	
15.00	37	39	1,844	120	6	13				70	9
15.50			3,051								
15.68	1										
16.00	82		1,619		95					32	
16.50			1,113							1	
16.68	1										
17.00	1,750	49	465		1,235	31				1,573	14
17.50	5										
17.88	1										
18.00	13		15,114		1					2	
18.18	1										
18.50	3										
18.75			1		1					2	
19.00	1		27,675								
19.18	2										
19.50	3										
19.75							1				
19.84½	1										
20.00	70	106	18,149	314	208	689				110	9
20.36	1										
20.50	2										
20.68	3										
21.00	1		11,219								
21.25	16									2	
21.50			16,236							1	
21.68	1										
21.75	1										
22.00	62		22,367		216					57	
22.50	2									4	
22.59½	1										
22.94½	1										
23.00	1		8,679								
23.14½	1										
23.49½	1										
23.50			1								
23.54	1										
23.68	1										
23.86	1										
24.00	990		28,020		5,940	1				597	
24.18	1										
24.50			1								
24.99	1										
25.00	64	1,008	16,806		366	40,023			243,492	22	1,0[illegible]
25.14½	1										

EXHIBIT 19.—*Statement showing by classes the different monthly rates paid to pensioners under the general pension laws and the number at each rate on the roll June 30, 1918*—Continued.

Rate.	Regular Establishments.		Civil War.							War with Spain.	
	Invalids.	Widows, etc.	Act May 11, 1912.	Act Feb. 6, 1907.	General law.		Act June 27, 1890.		Act Apr. 19, 1908.	Invalids.	Widows, etc.
					Invalids.	Widows, etc.	Invalids.	Minors, etc.	Widows.		
$25.25	1										
26.04½	1										
26.18	3										
26.36	1										
26.64	1										
26.94½	1										
27.00	26		11,659		285					19	
27.19	1										
27.36	1										
27.50	4		1							1	
27.59½	1										
28.00	1		1								
28.25	4										
28.29	3										
28.50	1										
28.64½	1										
28.68	1										
28.69½	1										
29.00			5							1	
29.18	2									1	
29.36	1										
29.39	1										
29.94	1										
30.00	839	234	81,265		6,255	175				409	20
30.50	1										
30.68	1										
31.00	3		1								
31.04	1										
31.18	1										
31.24	2										
31.25			1								
31.50	1		7								
31.68			1								
31.84	1										
32.00	2		15								
32.18										1	
32.36	1										
32.50	1		4								
32.94½	1										
33.00	3		5			1					
33.75	1										
34.00	2		22								
34.18	1										
34.25	2										
34.50	3										
34.64½	1										
34.86	1										
35.00	1		38								
35.04½	1										
35.50	1										
35.68	1										
36.00	8				12					1	
36.18	1										
36.59½	1										
36.64½	1										
37.00			4			2					
37.18										1	
37.19½	1										
37.36	1										
37.50	19		2								
37.68	2										
37.86	1										
37.94	1										
38.00	1		13								
38.14	1										
38.19	1										
38.36	1										
40.00			2								

EXHIBIT 19.—*Statement showing by classes the different monthly rates paid to pensioners under the general pension laws and the number at each rate on the roll June 30, 1918*—Continued.

Rate.	Regular Establishments.		Civil War.							War with Spain.	
	Invalids.	Widows, etc.	Act May 11, 1912.	Act Feb. 6, 1907.	General law.		Act June 27, 1890.		Act Apr. 19, 1908.	Invalids.	Widows, etc.
					Invalids.	Widows, etc.	Invalids.	Minors, etc.	Widows.		
$39.25	1										
39.29	1										
39.75	1										
39.99½	1										
40.00	192		163		1,306					92	
40.44½	1										
40.50	1										
40.68	1										
40.74½	1										
40.99½	1										
41.00	2		2								
41.64½				1							
41.68	1										
41.79	1										
42.09½	1										
42.50			1								
42.89½	1										
43.50			1								
43.69	1										
44.00	2										
44.36	1										
44.49	1										
44.50			1								
44.59	1										
44.86	1										
45.09½	1										
45.14½	2										
45.54	1										
45.89	2										
46.00	99				675					55	
46.44	5										
46.50	2										
46.79½	1										
46.94	1										
47.00	1										
47.54	1										
48.00	2										
48.59	1										
48.78	1										
48.84	4										
48.86										1	
49.00						1					
50.00	90				463					57	
50.25	1										
52.00	2										
52.09½	1										
52.44	1										
52.59½	2										
53.54	2										
53.64½	1										
54.00	2										
55.00	36				748					27	
55.19	1										
55.89	1										
56.00	1				2						
56.58	1										
56.99	1										
57.50	1										
57.89	2										
58.00	1										
58.44	2										
58.99	1										
59.00	1				1						
60.00	2				1						
60.44	2										
60.49½	1										
61.04½	1										
61.44	1										

EXHIBIT 19.—*Statement showing by classes the different monthly rates paid to pensioners under the general pension laws and the number at each rate on the roll June 30, 1918*—Continued.

Rate.	Regular Establishments.		Civil War.							War with Spain.	
	Invalids.	Widows, etc.	Act May 11, 1912.	Act Feb. 6, 1907.	General law.		Act June 27, 1890.		Act Apr. 19, 1908.	Invalids.	Widows, etc.
					Invalids.	Widows, etc.	Invalids.	Minors, etc.	Widows.		
$62.14½	1										
62.36	1										
62.69½	1										
62.86	1										
63.00	1										
63.44	3										
64.50	1										
65.00					4						
70.00					1						
71.89½	1										
72.00	64				216					47	
74.09½	1										
80.00	2										
81.44	1										
82.00					1						
82.50	2										
94.04½	1										
100.00	48				237					11	
117.14½	1										
Total	14,791	4,128	266,443	1,024	19,052	41,699	421	2,588	243,492	22,273	3,656

In addition to the above there were at the close of the year:

Army nurses, 118 at $12.

War of 1812: Widows—36 at $12; 54 at $20.

War with Mexico: Survivors—1 at $15; 6 at $20; 267 at $30; widows—1,006 at $12; 1,620 at $20; 268 at $25.

Indian wars: Survivors—1 at $8; 2,375 at $20; 8 at $30; widows—1,727 at $12; 35 at $25.

War of 1917: Invalids—3 at $6; 2 at $8; 1 at $10; 5 at $12; 8 at $17; 1 at $24; 3 at $40; 1 at $55; widows, etc.—1 at $2; 15 at $12; 1 at $15; 3 at $20; 7 at $25; 5 at $30.

Exhibit 20.—*Statement showing by classes the different monthly rates paid to pensioners under special acts of Congress and the number at each rate on the roll June 30, 1918.*

Rate.	Regular establishment.		Civil War.			War with Spain.		War of 1812.	War with Mexico.		Indian wars.	
	Invalids.	Widows, etc.	Invalids.	Nurses.	Widows, etc.	Invalids.	Widows, etc.	Widows.	Survivors.	Widows.	Survivors.	Widows.
$6.00	5		4			12	1					
7.50						1						
8.00	7		11		1	43	1			1	6	
10.00	6		7		2	42						
12.00	184	125	199	31	705	676	161	4	1	40	1	27
12.50						1						
14.00	4		8		3	8						
15.00	4	2	11		2	30	2					
16.00	8		2			16					26	
17.00	40	5	18		1	143	3					
17.50			1									
18.00	4	1	4		32	5	1					
20.00	29	25	193	5	30	64	7		3	110	2	28
21.00			19									
22.00		1	1			2						
22.50			6									
24.00	61	4	3,258	7	6	97	1	5				
25.00		74	11	1	3,838	3	94			4		
27.00			91									
30.00	53	74	5,317		165	85	18		3	3	1	
33.00					2							
34.00			5									
35.00		31			14		5			1		
36.00	3		1,135	1	1	3						
37.00		1			178							
40.00	15	69	952		16	7	11		5	2	1	
45.00	1	1	14		1							
46.00	2		13			4						
49.00					2							
50.00	14	59	549		33	20	14		3	1		
55.00			14			1						
60.00	1		3									
65.00			1									
67.00			1									
72.00	1		13		1	1						
75.00		1			3							
100.00		7	7		6	1						
125.00		1										
166.66⅔					1							
208.33⅓		1										
Total	'442	482	11,868	45	5,043	1,265	319	9	15	171	37	55

Exhibit 21.—*Total number of certificates issued on account of all claims allowed since the establishment of the pension system (to include June 30, 1918).*

Original soldiers' and sailors' claims allowed:			
Revolutionary War			[illegible]
War of 1812			35,73[illegible]
Mexican War			[illegible]
Indian wars			3,4[illegible]
Old wars, prior to Mar. 4, 1861			9,4[illegible]
Army, since Mar. 4, 1861 (exclusive of War with Spain)			1,136,[illegible]
Navy, since Mar. 4, 1861 (exclusive of War with Spain)			44,7[illegible]
War with Spain—			
Army		30,586	
Navy		1,069	
			31,655
Total			1,329,613
Reissue and increase claims allowed:			
Revolutionary War		2,902	
Mexican War (approximated)		20,689	
Indian wars (approximated)		646	
Army (approximated and exclusive of War with Spain)		3,640,801	
Navy (approximated and exclusive of War with Spain)		131,558	
War with Spain—			
Army	15,511		
Navy	436		
		15,947	
			3,812,[illegible]
Total soldiers' and sailors' claims allowed			5,141,966

Original widows' claims allowed:		
Revolutionary War widows		22,644
Revolutionary War daughters (special acts)		18
War of 1812		35,520
Mexican War		16,250
Indian wars		8,606
Old wars, prior to Mar. 4, 1861		8,039
Army, since Mar. 4, 1861 (exclusive of War with Spain)		835,023
Navy, since Mar. 4, 1861 (exclusive of War with Spain)		26,672
War with Spain—		
Army	7,670	
Navy	431	
		8,101
Total		960,873
Reissue and increase claims allowed:		
War with Spain (Army, 225; Navy, 27)	252	
All other acts (approximated)	68,987	
		69,239
Total widows' claims allowed		1,030,112
Approximated number of issues on account of all claims allowed:		
Soldiers and sailors		5,141,944
Widows		1,030,112
Total		6,172,056

EXHIBIT 22.—*Number of pensions granted by special acts each Congress since Mar. 4, 1861.*

Thirty-seventh (1861-1863)	12	Fifty-third (1893-1895)	119
Thirty-eighth (1863-1865)	27	Fifty-fourth (1895-1897)	378
Thirty-ninth (1865-1867)	138	Fifty-fifth (1897-1899)	694
Fortieth (1867-1869)	275	Fifty-sixth (1899-1901)	1,391
Forty-first (1869-1871)	85	Fifty-seventh (1901-1903)	2,171
Forty-second (1871-1873)	167	Fifty-eighth (1903-1905)	3,355
Forty-third (1873-1875)	182	Fifty-ninth (1905-1907)	6,030
Forty-fourth (1875-1877)	98	Sixtieth (1907-1909)	6,600
Forty-fifth (1877-1879)	230	Sixty-first (1909-1911)	9,649
Forty-sixth (1879-1881)	96	Sixty-second (1911-1913)	6,350
Forty-seventh (1881-1883)	216	Sixty-third (1913-1915)	5,061
Forty-eighth (1883-1885)	598	Sixty-fourth (1915-1917)	5,885
Forty-ninth (1885-1887)	856	Sixty-fifth (1917 to June 30, 1918)	199
Fiftieth (1887-1889)	1,015		
Fifty-first (1889-1891)	1,388	Total	53,482
Fifty-second (1891-1893)	217		

EXHIBIT 23.—*Pension claims pending June 30, 1918.*

Act of May 11, 1912	8,647
Other acts	42,479
Total	51,126
Act of Mar. 3, 1899, deserted wives	93
Act of Mar. 2, 1895:	
Accrued	7,951
Reimbursement	1,579
Cases before Board of Pension Appeals	312

EXHIBIT 24.—*Revolutionary War archives.*

Total pension claims on file:	
Admitted	78,284
Rejected	10,319
Bounty land claims	8,843
Calls at the bureau for the examination of records, 1918	628
Certificates of service furnished, 1918	1,543
Negative replies given, 1918	1,750
Answers to miscellaneous matters, 1918	864
Claims drawn from the files for consideration, 1918	13,425

EXHIBIT 25.—*Record cards completed to June 30, 1918, in Certificate Division.*

[This table shows all the different series of certificate numbers and the highest number given thereto.]

Series.	Number of cards completed.	Highest certificate number given in series.	Remarks.
Old wars:			
Invalids	9,486	9,486	
Widows	0	8,039	
War of 1812:			
Survivors	25,723	25,723	Service pensions.
Widows	35,520	35,520	
Indian wars:			
Survivors	8,482	8,482	Do.
Widows	8,606	8,606	
Mexican War:			
Survivors	20,668	20,668	Do.
Widows	16,250	16,250	
Navy:			
Invalids	28,256	42,035	Merged with Army series Aug. 12, 1916.
Widows	21,618	21,618	Merged with Army series Aug. 13, 1916.
Invalids (Army and Navy)[1]	10,178	1,180,178	
Widows (Army and Navy)[1]	89,807	848,179	
Total	274,594		

[1] There is no separate series of certificate numbers on account of War with Spain and Regular Establishment allowances, which are included in the Invalid and widow Army and Navy series.

Revolutionary War soldiers pensioned	82,394
Revolutionary War widows pensioned	22,644
Revolutionary War daughters pensioned (special acts)	18

Old war invalid series of certificate numbers runs from No. 1 to No. 9486.
Civil War invalid series of certificate numbers begins with No. 9487.

EXHIBIT 26.—*Carding of records in Record Division.*

Service record cards written	12,968	
Numerical record cards written (completed)	4,360	
Alphabetical record cards written	15,398	
Total		32,726
Cards canceled through consolidation and correction		4,549
Net total		28,177
Numerical record cards written (incomplete)		28,142
Grand total cards written to June 30, 1918:		
Service record cards	2,518,758	
Numerical record cards (completed)	463,758	
Alphabetical record cards	2,763,919	
		5,746,435
Total cards canceled through consolidation and correction		372,783
Grand total completed cards on file		5,373,652
Numerical record cards (incomplete)		452,370
Act May 11, 1912:		
Cards filed—		
Original		2,027
Increase		18,149
Cards stamped "Dead"		31,351
Cards canceled		18,149
Total on file		428,387

EXAMINING SURGEONS.

EXHIBIT 27.—*Report for fiscal year ended June 30, 1918.*

States.	Examining boards.	Examinations by boards.	Single surgeons.	Examinations by single surgeons.	Expert surgeons.	Examinations by experts.
Alabama	9	21	....	....	7	7
Arizona	1	5	2	....	2	1
Arkansas	18	45	6	6	8	6
California	19	176	4	8	20	29
Colorado	18	63	5	3	12	4
Connecticut	9	21	1	....	5	1
Delaware	3	10	....	....	2	....
District of Columbia	3	119	....	....	10	27
Florida	9	25	2	1	7	3
Georgia	7	40	4	6	12	8
Idaho	5	9	4	1	3	3
Illinois	89	189	3	3	30	34
Indiana	85	277	2	1	23	47
Iowa	76	48	4	....	17	16
Kansas	66	84	6	3	22	10
Kentucky	65	180	3	3	11	20
Louisiana	3	12	3	6	6	6
Maine	24	45	1	1	12	5
Maryland	9	33	1	....	5	7
Massachusetts	22	88	....	....	15	16
Michigan	53	129	3	1	21	11
Minnesota	29	30	17	5	12	10
Mississippi	7	15	1	....	7	4
Missouri	80	114	3	2	29	29
Montana	4	10	5	2	8	1
Nebraska	46	21	6	....	7	3
Nevada	3	3	....	....	1	....
New Hampshire	12	10	....	....	2	....
New Jersey	10	51	....	....	2	1
New Mexico	4	50	7	1	3	1
New York	59	253	1	....	28	48
North Carolina	13	44	8	10	8	4
North Dakota	4	1	1	....	4	1
Ohio	88	308	3	....	36	38
Oklahoma	35	45	1	....	14	4
Oregon	12	25	6	....	10	6
Pennsylvania	73	181	3	....	23	28
Rhode Island	2	4	....	....	2	5
South Carolina	3	16	2	2	4	4
South Dakota	19	11	8	1	10	6
Tennessee	39	158	2	1	15	20
Texas	12	64	6	12	18	9
Utah	2	11	....	....	2	1
Vermont	14	28	1	....	7	....
Virginia	7	42	....	....	10	7
Washington	13	43	4	1	7	8
West Virginia	33	52	2	1	9	15
Wisconsin	46	66	6	1	13	3
Wyoming	2	4	5	4	1	1
Total	1,263	3,279	152	86	542	518

EXHIBIT 28.—*Special examinations, number made, cost thereof, etc., during the fiscal year ended June 30, 1918.*

Appropriated by Congress to investigation of pension cases		$80,0[illegible]
Expenses of special examiners:		
Per diem, in lieu of subsistence	$52,416.00	
Transportation and incidentals	25,242.51	
Miscellaneous	2,070.15	
Total		79,72[illegible]
Unexpended balance		271.[illegible]
Average number of special examiners employed		[illegible]
Number of depositions taken		[illegible]
Number of reports submitted		5,[illegible]
Average cost per report		$12.73
Recoveries made by special examiners		$2,919.[illegible]
Review		
Reports reviewed and referred for further examination		2,[illegible]
Submitted to Board of Review for final action		2,[illegible]
Submitted to other divisions		944
Total number of reports reviewed in division		6,[illegible]
Cases:		
In special examination division July 1, 1917	1,387	
Received during the year	3,755	
		5,142
Disposed of during the year		3,174
Number on hand June 30, 1918		1,[illegible]

EXHIBIT 29.—*Appealed cases, year ending June 30, 1918.*

	Awaiting action of Board of Review.	Awaiting action of Secretary.	Total
On hand July 1, 1917	26	233	[illegible]
Received during year 1917-18	760		[illegible]
	786	233	1,0[illegible]
Referred to board for further evidence	1	1	
	787	232	1,0[illegible]
Referred to Secretary, 685 receded, 49; returned, 45; dismissed by board, 1	780	685	[illegible]
	7	917	[illegible]
Affirmed, 521; reversed, 75; dismissed, 16		612	612
On hand June 30, 1918	7	305	[illegible]

REPORT OF THE COMMISSIONER OF PATENTS

ANNUAL REPORT OF THE COMMISSIONER OF PATENTS.

DEPARTMENT OF THE INTERIOR.

UNITED STATES PATENT OFFICE,

WASHINGTON, D. C.,

SEPTEMBER 17, 1918.

SIR: I have the honor to submit herewith the following report of the business of the United States Patent Office for the fiscal year ended June 30, 1918:

Applications received during fiscal year ended June 30, 1918.

Applications for patents for inventions	62,399
Applications for patents for designs	2,367
Applications for reissues of patents	213
Applications for registration of trade-marks	7,282
Applications for registration of labels	763
Applications for registration of prints	283
Total applications	73,307
Disclaimers	19
Appeals on the merits	2,072
Notices of opposition	203
Total applications, disclaimers, appeals, and notices of opposition	75,601

Applications for patents for inventions.

Year ended June 30—		Year ended June 30—	
1909	62,800	1914	69,311
1910	63,365	1915	66,497
1911	65,365	1916	67,348
1912	69,236	1917	68,690
1913	67,986	1918	62,399

Applications for patents, including reissues, designs, trade-marks, labels, and prints.

Year ended June 30—		Year ended June 30—	
1909	73,026	1914	81,539
1910	72,533	1915	79,116
1911	74,677	1916	80,621
1912	79,747	1917	81,538
1913	78,411	1918	73,307

Applications awaiting action.

June 30—		June 30—	
1913	27,328	1916	16,559
1914	22,283	1917	16,058
1915	18,270	1918	14,769

Patents withheld and patents expired.

	1917	1918
Letters patent withheld for nonpayment of final fees	10,504	9,313
Applications allowed awaiting payment of final fees	15,274	16,235
Patents expired	24,777	24,[illegible]
Applications in which issue of patent is deferred under sec. 4885, R. S	120	142
Applications in process of issue	3,745	3,[illegible]

Patents granted and trade-marks, labels, and prints registered.

Class.	1914	1915	1916	1917	1918
Letters patent	36,276	42,734	44,155	42,358	39,214
Design patents	1,773	1,489	1,761	1,686	1,146
Reissue patents	176	179	217	165	166
Trade-marks	5,795	6,919	6,109	6,126	4,844
Labels	720	762	833	751	516
Prints	340	321	402	342	193
Total	45,080	52,404	53,477	51,428	46,079

Receipts from all sources, fiscal year ended June 30, 1918.

Applications, first fees	$935,784.15
Designs	34,370.00
Reissues	6,390.00
Trade-marks	72,929.00
Final fees	778,808.00
Appeals and oppositions	26,315.00
Disclaimers	190.00
Coupons	52,363.65
Drawings	4,796.33
Recording assignments	27,008.94
Labels	4,363.00
Prints	1,573.00
Court costs	46.35
Copies of records	141,365.44
Unapplied	16.00
Official Gazette and other publications	17,341.70
Total	2,103,660.56

Expenditures, fiscal year ended June 30, 1918.

Salaries	$1,373,946.99
Scientific library	2,966.40
Transportation of patents to foreign countries	481.40
Postage on foreign mail	523.00
Stationery	15,372.56
Furniture and sundries	8,159.57
Ice	360.90
Washing towels	143.28
Winding clocks	168.96
Telephones	426.72
Telegraphing	79.18
Investigating public use	259.48
Photolithographing:	
Current issue	51,571.50
Reproductions	53,082.44
Foreign patents	13,185.00
Photographic printing	3,564.01
Photostat supplies	9,342.64

Printing and binding:	
Official Gazette	$126,374.62
Indexes	4,532.52
Specifications	350,906.62
Miscellaneous	25,908.01
German patents	19,483.08
International Convention for Protection of Industrial Property	
Coal	16,432.00
Fixed charges not enumerated	389.40
Total	2,077,660.30
Special and temporary typewriters	1,367.50
Increase in compensation	52,588.38
Grand total	2,131,616.18

Receipts and expenditures.

Expenditures	$2,131,616.18
Receipts from all sources	2,103,660.56
Net deficit	27,955.62
Total net surplus to date	8,191,115.73

Comparative statement.

June 30—	Receipts.	Expenditures.	Surplus.
1908	$1,874,180.75	$1,608,292.01	$265,888.74
1909	1,975,919.97	1,887,443.35	88,476.62
1910	2,022,043.26	1,953,549.76	68,493.50
1911	1,987,778.58	1,957,001.85	30,776.73
1912	2,094,059.50	2,019,236.01	74,823.49
1913	2,082,490.23	1,924,459.42	158,030.81
1914	2,169,988.95	1,929,132.52	240,856.43
1915	2,270,937.68	2,087,581.26	183,356.42
1916	2,334,030.48	2,051,656.79	282,373.69
1917	2,317,519.72	2,095,138.68	222,381.04
1918	2,103,660.56	2,131,616.18	−27,955.62

Appellate work.

Interferences declared	1,258
Interferences disposed of before final hearing	1,118
Interferences heard	307
Interferences disposed of	335
Interferences awaiting decision	28
Oldest case awaiting action, Mar. 8, 1918.	
Appeals to examiners-in-chief in interference cases	253
Ex parte appeals to examiners-in-chief	1,255
Total	1,508
Appeals in interference cases disposed of	237
Ex parte appeals disposed of	1,472
Total	1,709
Interference cases awaiting action	112
Ex parte cases awaiting action	466
Total	578
Oldest interference case awaiting action, Mar. 5, 1918.	
Oldest ex parte case awaiting action, Apr. 8, 1918.	
Appeals to commissioner in interference cases	149
Appeals to commissioner in opposition cases	32
Appeals to commissioner in cancellations	6

Ex parte appeals to commissioner	182
Interlocutory appeals to commissioner	125
Ex parte appeals in trade-mark cases	137
Total	641
Petitions to commissioner	4,001
Total	4,642

Cases disposed of by commissioner:	
Appeals in interference cases	149
Appeals in opposition cases	31
Appeals in cancellation cases	8
Ex parte appeals	208
Interlocutory appeals	140
Ex parte appeals in trade-mark cases	114
Total	650
Petitions to commissioner	4,007
Total	4,657

Appeals to Court of Appeals, District of Columbia:	
Ex parte cases	35
Interference cases	65
Opposition cases	12
Cancellation cases	9
Total	121

During the year 64,979 applications for patents, including reissues and designs, and 162,300 amendments in pending cases were filed. The number of letters constituting the miscellaneous correspondence received and indexed was 251,859.

The number of printed copies of specifications of patents sold was 2,541,880, for which a revenue of $127,094 was received by the office, this amount being a decrease of $12,218.80 over the receipts of last year from the sale of copies. A total of 1,201,009 copies of patents were shipped to foreign governments. The whole number of copies of patents furnished for sale, for Governmental use and for foreign governments was 3,986,781.

The office received for record 28,285 deeds of assignment, containing on an average 456.45 words per deed.

Typewritten copies of records aggregating 25,519,100 words were furnished, at 10 cents per hundred words, and for certifying certain of these copies, $1,113.75 was received.

For 98,924 photostat copies of foreign patents the office received $19,151.60.

Respectfully submitted.

J. T. Newton,
Commissioner of Patents.

The Secretary of the Interior.

STATEMENT OF THE COMMISSIONER OF EDUCATION

STATEMENT OF THE COMMISSIONER OF EDUCATION.

DEPARTMENT OF THE INTERIOR,
BUREAU OF EDUCATION,
Washington, D. C., September 9, 1918.

SIR: I have the honor to submit the following statement of the operations of this office for the fiscal year ended June 30, 1918, together with recommendations for the extension and improvement of its work:

SECTION I.

STATISTICS.

In accordance with the decision to collect detailed educational statistics biennially, no statistics for the school year ended June 30, 1917, were gathered. Consequently the members of the staff of the statistical division were able to assist in the preparation of statistical material needed in the preparation of reports of educational surveys and other special investigations. Among the projects on which this division was engaged are the following: Tabulating courses of study in summer schools, questionnaires on agricultural instruction in public high schools, relative enrollment in elementary and high schools in 1916 and 1917, questionnaires on enrollment in universities, colleges, and secondary schools, increase in salaries of teachers, courses of study in agricultural and mechanical colleges, material for survey of educational conditions in Tennessee, and four questionnaires on commercial education; revising educational directory; collecting and compiling statistics of all free public libraries in the United States.

Probably the largest and most important piece of work was the securing of the names and post-office addresses of individual schoolhouses in the United States and making a mailing list of such schoolhouses on addressograph plates. The list now contains about 182,000 names and should be completed at an early date. This list is useful not only to the Bureau of Education in enabling it to reach directly teachers, school boards, and school communities, but also to many other departments and bureaus of the Government. It is especially helpful to those in war time in getting messages directly to the people.

CORRESPONDENCE.

The report of the mails and files division at Washington shows for the year ending June 30, 1918:

Letters received	162,479
Library publications received	34,780
Statistical reports received	43,578
Documents distributed	802,835
Mimeographed letters sent out	1,260,225
United States School Garden Army leaflets sent out	1,343,100

The offices and stations of the bureau outside of Washington report for the same period:

Letters received	29,079
Statistical reports received	6,922
Printed and mimeographed material sent out	956,479

These figures show that the correspondence of the bureau is growing rapidly. The number of pieces of first-class mail received is almost 25,000 in excess of the number received during the preceding year and is more than ten times as large as the number received in the year 1910.

LIBRARY.

At the opening of the year the greater part of the books of the library still remained in disorder from the recent removal of the bureau to its present location in the Pension Building. The staff gave its first attention to the shelving and arranging of the collections, so that the catalogued books and main reference works were brought completely into order early in the year. A great amount of time, all that could be spared from current duties, was spent during the entire year in working over masses of other material, such as catalogues and reports of colleges, universities, and professional schools, textbooks, and foreign publications. Many boxes of books were also taken from storage in the basement of the building, where they had remained several years, and their contents, consisting chiefly of textbooks, sorted and shelved. Nearly all the material now on the library shelves has been classified and arranged, but there still remain in the basement a large number of boxes, which are brought up and opened as rapidly as their contents can be handled by the assistants available for this work. The cataloguing and arranging of the new books and pamphlets added to the library during the year was kept up to date. The time required to bring the library into order in its new location after the removal necessarily caused a falling off in various regular activities.

Ten monthly numbers of the record of educational publications were issued during the year, together with an index number to the 1917 series. The lantern slides of public and school libraries and the school library exhibit have continued to be used to some extent by borrowers outside of Washington.

Statistics of business transacted by the library during the year show the following: Volumes and pamphlets added by gift, by exchange, and by purchase, 2,340; by copyright transfer from the Library of Congress, 691; serial numbers accessioned, 8,801; periodical numbers, 8,913; volumes received from the bindery, 1,043. The number of volumes catalogued and classified was 4,114; bibliographies compiled, 144. Volumes loaned to borrowers outside the office amounted to 2,380, and 3,113 letters requesting books or information were answered, many of them by supplying copies of the library's bibliographies on the subjects to which the inquiries referred.

EDITORIAL.

The publications of the Bureau of Education for 1917-18 included the annual report of the commissioner for 1917, 54 issues of the bulletin of the office, and numerous circulars and reprints. Volume I of the annual report contained about 100 pages treating of (1) education and the war, (2) educational surveys, (3) general activities of the bureau, (4) educational conditions in the warring countries, and (5) recommendations. Volume II contained the usual statistics of education in the United States, for the year 1915–16. The miscellaneous circulars and leaflets consisted chiefly of the brief mimeographed and multigraphed letters on current educational topics.

In cooperation with the United States Food Administration, the bureau issued three series of leaflets containing a total of 96 lessons on community and national life for use in the elementary and high-school classes. These were widely used in all parts of the United States and more than 3,000,000 copies were sold by the Superintendent of Documents.

The bulletins issued during the year were as follows:

1916.

23. Open-air schools.
49. Medical inspection in Great Britain.

1917

2. Reorganization of English in secondary schools.
8. Current practice in city school administration.
9. Department-store education.
10. Development of arithmetic as a school subject.
11. Higher technical education in foreign countries.
15. Studies in higher education in Ireland and Wales.
16. Studies in higher education in England and Scotland.
17. Accredited higher institutions.
18. History of public school education in Delaware.
19. Report of a survey of the University of Nevada.
22. Money value of education.
23. Three short courses in home making.
25. Military training of youths of school age in foreign countries.
26. Garden clubs in the schools of Englewood, N. J.
29. Practice teaching for secondary school teachers.
30. School extension statistics, 1915–16.
31. Rural-teacher preparation in county training schools and high schools.
32. Work of the Bureau of Education for the natives of Alaska, 1915–16.
33. A comparison of the salaries of rural and urban superintendents of schools.
34. Institutions in the United States giving instruction in agriculture.
35. The township and community high-school movement in Illinois.
36. Demand for vocational education in the countries at war.
37. The conference on training for foreign service.
38. Vocational teachers for secondary schools.
39. Teaching English to aliens.
40. Monthly record of current educational publications, September, 1917.
41. Library books for high schools.
42. Monthly record of current educational publications, October, 1917.
43. Educational directory, 1917–18.
44. Educational conditions in Arizona.
45. Summer sessions in city schools.
46. The public-school system of San Francisco, Cal.
47. The preparation and preservation of vegetables.
48. Monthly record of current educational publications, November, 1917.
49. Music in secondary schools.
50. Physical education in secondary schools.
51. Moral values in secondary education.
52. Monthly record of current educational publications, December, 1917.
53. The conifers of the Northern Rockies.
54. Training in courtesy.
55. Statistics of State universities and State colleges, 1917.

1918.

1. Monthly record of current educational publications, January, 1918.
2. Agricultural instruction in the high schools of six eastern States.
4. Monthly record of current educational publications, February, 1918.
5. Work of the Bureau of Education for the natives of Alaska, 1916–17.
7. The bureau of extension of the University of North Carolina.
8. Monthly record of current educational publications, March, 1918.
9. Union list of mathematical periodicals.
11. A community center—what it is and how to organize it.
12. Monthly record of current educational publications, April, 1918.
13. The land-grant of 1862 and the land-grant colleges.
14. Monthly record of current educational publications, May, 1918.

On account of the large amount of printing rendered necessary by the war, and which necessarily takes precedence, the publications of the bureau have been much delayed. The following bulletins were in the hands of the printer at the close of the year:

Training of Teachers of Mathematics.
Guide to United States Government Publications.
Curriculum of the Woman's College.
Public School Classes for Crippled Children.
Educational Survey of Elyria, Ohio.
Facilidades Ofrecidas a Los Estudiantes Extranjeros.
History of Public School Education in Arizona.
Americanization as a War Measure.
Vocational Guidance in Secondary Education.
Monthly Record of Current Educational Publications, June, 1918.
Instruction in Journalism in Institutions of Higher Education.
Monthly record of Current Educational Publications: Index, February, 1917, to January, 1918.
State Laws Relating to Education.
Vocational Guidance in the Public Schools.
Industrial Education in Wilmington, Delaware.
The National Council of Primary Education.
Rural-teacher Preparation in State Normal Schools.
The Public Schools of Columbia, South Carolina.
American Agricultural Colleges.
Resources and Standards of Colleges of Arts and Sciences.
Educational System of South Dakota.
Teaching American Ideals through Literature.
Monthly Record of Current Educational Publications, September, 1918.

SECTION II.

SURVEYS.

Thirteen different surveys of educational systems and institutions were carried on by members of the bureau during the year. Of this number eight were begun during preceding years.

The final report of the survey of the public schools of Webster Groves, Mo., was completed during the year and submitted. This survey was made by the chief of the division of school administration, assisted by Dr. W. W. Charters, then of the University of Missouri. and Mr. Henry J. Gerling, of St. Louis, Mo.

The final report of the survey of the public school system of San Francisco, Cal., was issued as Bulletin 1917, No. 46,

Work on the educational survey of the State of Delaware, with special reference to industrial education in the city of Wilmington, was continued by the specialist in industrial education.

The survey of the rural schools of Walker and Falls Counties, Tex., was completed and a final report thereon was made.

The report of the survey of the public school system of Elyria, Ohio, was completed during the year and will be issued as Bulletin 1918, No. 15.

Work was continued on the educational survey of the State of Tennessee. This survey was made by the specialist in rural-school administration, two specialists in rural education, and one of the specialists in home economics. The report has been completed but not yet published.

The report of the survey of the Bradley Polytechnic Institute, Peoria, Ill., requested by the administration of that institution, was completed by the specialist in higher education and the specialist in industrial education.

The final report of the survey of the educational system of the State of Arizona, excepting the report on the State University, was completed and issued as Bulletin 1917, No. 44. A preliminary report on the survey of the State University has been submitted to the officers of that institution.

In accordance with the provisions of an act of the legislature of South Dakota this bureau has made a survey of the entire educational system of that State, including all schools and educational institutions supported by public funds. The survey was made under the direction of the specialist in rural school practice, assisted by the specialist in higher education, the specialist in agricultural education, specialist in home economics, assistant in rural education, and by Dr. William F. Russell, dean of the school of education of the University of Iowa, Dr. Henry B. Wilson, superintendent of schools of Topeka, Kans., and Dr. Alexander J. Inglis, professor of secondary education in Harvard University. The preliminary report of the survey was transmitted to the survey commission of the State on June 14, 1918, and the recommendations made therein were accepted by the survey commission. The final report is now in press.

At the request of the board of education of the city of Columbia, S. C., the bureau undertook a survey of the school system of that city. The survey was made under the immediate direction of the specialist in city-school systems, assisted by the chief clerk of the bureau, one of the specialists in home economics, specialist in school and home gardening, and Dr. Carleton B. Gibson, superintendent of city schools, Savannah, Ga. The preliminary report of the survey has been submitted to the board of education of Columbia, and the final report is now in press.

With the cooperation of the Department of Labor the bureau has made a study of industrial conditions in the city of Richmond, Va., with a view to the establishment of cooperative half-time classes for young people of high-school age. The work on the part of the bureau was done by the specialist in industrial education and the specialist in city school systems.

The specialist in rural-school practice was granted leave of absence without pay for the purpose of making for the provincial government of the Province of Saskatchewan, Canada, a survey of education in that Province. The report has been completed and issued as a public document by the government of the Province.

At the request of the National Association of Accredited Commercial Schools a survey was made of the member schools of that association located in the cities of Pittsburgh, Pa., Jamestown, N. Y., Rochester, N. Y., Trenton, N. J., Philadelphia, Pa., and Wilmington, Del. The survey was made by the specialist in commercial education of this bureau.

WAR WORK.

Much of the time of the staff of some of the divisions in the bureau has been given to work relating more or less directly to the war, and especially to work in connection with the conduct of educational institutions during the war. Some of the principal activities in this direction have been as follows:

HIGHER EDUCATION.

The work of the division has been mainly in conntion with the participation of higher institutions in the war. It has consisted in the personal service of the specialist in higher education as executive secretary of the Committee on Education of the Advisory Commission of the Council of National Defense, as chairman of the War Council of the Bureau of Education, and as a member of the Advisory Board of the Committee on Education and Special Training of the War Department; in the preparation of circulars and multigraphed letters bearing on the effects of the war on colleges and universities; in the conduct of a voluminous correspondence; in the preparation for the use of the committees of the Council of National Defense and of the War Department of statistics and documents; and in attendance at meetings and addresses by the specialist in higher education on the educational work of the War Department, of the Council of National Defense, and on the activities of the Bureau of Education.

Seven circulars on the "Work of American Colleges and Universities During the War"; two Higher Education Letters, on "The Four-Quarter System" and on the "Canadian Soldiers' College"; Teachers' Leaflet No. 2, on "Education in Patriotism"; and two Secondary School Circulars have been issued by the division As executive secretary of the subcommittee of the Council of National Defense on the Relation of Engineering Schools to the National Government, the specialist in higher education prepared a report on the work of the committee. He also revised and forwarded for publication Teachers' Leaflet No. 1, for the National Board for Historical Service. At the request of the Secretary of the Interior the division prepared and sent out an elaborate questionnaire to all engineering schools, asking for detailed information concerning their facilities for offering technical instruction. The returns were tabulated and have since been used by the Committee on Education and Special Training in the selection of institutions for the technical training of drafted men.

The specialist in higher education also served on a committee of the Society for the Promotion of Engineering Education for the furloughing of engineering students, and with councils of the national engineering societies in deciding recommendations to be made to the War Department regarding the treatment of engineering students.

SCHOOL HYGIENE AND SANITATION.

The specialist in school hygiene and sanitation cooperated with the Committee on Venereal Diseases of the Medical Section of the Council of National Defense in the preparation of a pamphlet entitled "Keeping Fit," for high-school boys, which was issued under the joint auspices of the Council of National Defense and this bureau. The pamphlet includes information in regard to the principal causes for rejection of drafted men and a clear statement of sex hygiene and sex morality. He also prepared a schematic plan for physical education in colleges as an integral part of the military training program for the use of the Advisory Board of the Committee on Education and Special Training of the War Department. This covered plan of examination, classification for training and treatment, time factor, classification and graduation of physical training exercises.

VOCATIONAL EDUCATION.

Conferences were organized by the bureau for the purpose of considering and making recommendations regarding (1) the Government's policies with respect to the schools in war time, (2) science and industrial arts in secondary schools, (3) scientific and industrial training in the war emergency, and (4) cooperation between the public schools, the corporation schools, commerce, and labor. In January 1918, the bureau issued a war service call to manual-training classes outlining a plan for the construction of game tables for the Army Y. M. C. A. As a result of this appeal 2,523 game tables were constructed up to June 30, 1918, and donated by public-school pupils in 391 cities scattered throughout all the States except three. The tables were distributed among 39 camps, cantonments, and naval training stations located in 23 States.

The specialist in industrial education has rendered assistance to the Committee on Education and Special Training of the War Department in preparing a series of outlines of courses of instruction in mechanical trades for the use of institutions engaged in training mechanics for the Army.

NEGRO EDUCATION.

Assistance has been given to the War Department in the selection of the training schools for the Negro drafted men. Both the War Department and the Department of Labor have been given special information as to persons fitted for responsible positions. Other war agencies that have been assisted are the American Red Cross, the Y. M. C. A., the War Camp Community Service, the General War Time Commission of the Churches, the Committee on Public Information, the War Work Council of the National Board of Y. W. C. A., and the General Committee on Army and Navy Chaplains of the Federal Council of Churches. Probably the most valuable service this division has rendered in connection with the war has been the investigation of conditions among the Negro troops in and about the various cantonments. There is now available definite information as to the needs of the Negro soldiers both in the camps and in the communities near the camps. The facts thus assembled are now used by practically every agency working for the soldiers.

LIBRARY.

As aids in the study of conditions arising from the war, the library prepared and circulated bibliographies on various topics, including the following: Education as affected in general by the war both in the United States and Europe, teaching of German in the public schools, education of illiterates, Americanization of aliens, civic education, education in patriotism, military education, and reeducation of crippled soldiers. Further assistance was given to special students of education and the war by the loan of books from the library. The division also suggested topics connected with the war for essays and orations for high-school graduates, and supplied references to sources of information on some of these subjects. A select list for public-school pupils was also compiled of books containing personal experiences of soldiers in the war, poetry of the war, and standard patriotic prose and poetry. This list was requested for inclusion in one of a series of lessons projected by the bureau. Upon request of the Library War Service, the division prepared lists of school and college text-books in various subjects suitable for the use of soldiers desiring to study these subjects in cantonments or military posts. The Library War Service undertakes to supply these books in its camp libraries, and reports that it has found the lists extremely useful in this connection. During the year, special attention has also been given in the monthly record of current educational publications to listing and annotating the literature of education in relation to the war.

UNITED STATES SCHOOL GARDEN ARMY.

In 1914 this bureau began the promotion of home gardening under school direction in the cities and towns of the United States with a view to furnishing profitable and educative employment to school children during out of school hours and the vacation periods. Owing to the small amount of funds available for this work it was necessary to limit it to a comparatively small section of the country. For the past three years two persons have been employed in this work by the bureau, and while approximately a hundred cities in all parts of the country were constantly receiving help from them, most of their time has been given to intensive work in the cities of a few of the Southern States, namely, Virginia, North Carolina, South Carolina, Georgia, and Tennessee. In some of the cities of these States the work has been placed on a firm basis and the results achieved are most encouraging. Large quantities of food products were raised by the school children in their home gardens, back and side yards, and on vacant lots.

According to reports received at the bureau 488 cities throughout the United States had school directed home gardens in 1917 with a total enrollment of 355,715 children, and the total cash value of vegetables raised by the children in 215 of the cities was $1,810,729.33. The total cost of home gardening, including salaries in those 215 cities, was $143,842.88, leaving a net profit of $1,666,886.45.

The war has brought home to our people the urgent necessity for increased food production and for the conservation of man power and transportation facilities. The success of home gardening under school direction already achieved was convincing proof that a general adoption of the plan in all cities and towns of the country would materially assist the food problem. With this end in view the President of the United States in February, 1918, allotted to the Department of the Interior for use by this bureau the sum of $50,000 from the appropriation for the National Security and Defense to be used in the promotion of home gardening under school direction during the following six months.

On February 25, 1918, the President wrote the following letter to Secretary Lane:

25 FEBRUARY, 1918.

MY DEAR MR. SECRETARY: I sincerely hope that you may be successful through the Bureau of Education in arousing the interest of teachers and children in the schools of the United States in the cultivation of home gardens. Every boy and girl who really sees what the home garden may mean will, I am sure, enter into the purpose with high spirits, because I am sure they would all like to feel that they are in fact fighting in France by joining the home garden army. They know that America has undertaken to send meat and flour and wheat and other foods for the support of the soldiers who are doing the fighting, for the men and women who are making the munitions, and for the boys and girls of western Europe, and that we must also feed ourselves while we are carrying on this war. The movement to establish gardens, therefore, and to have the children work in them is just as real and patriotic an effort as the building of ships or the firing of cannon. I hope that this spring every school will have a regiment in the Volunteer War Garden Army.

Cordially and sincerely, yours,

WOODROW WILSON.

HON. FRANKLIN K. LANE,
Secretary of the Interior.

Two main purposes prompted the planning of the United States School Garden Army: (*a*) Increased food production and (*b*) training of school children in thrift, industry, service, patriotism, and responsibility.

The necessity for man power was being felt. This was especially true in agricultural pursuits. Not alone were the drafted young men going from the farm, but great numbers of farm employees were being attracted to the cities by higher wages offered in other industries. If the millions of city boys and girls could be induced to give their leisure time to cultivating the thousands of acres of untilled land in front and back yards and vacant lots of our cities, towns, and villages, it would result in a substantial increase in food production and an improvement in the quality of our coming citizenship.

The Bureau of Education undertook to accomplish this through the organization of the United States School Garden Army. The field has not been seriously entered by any other organization. It is an educational problem and can be solved with economy and efficiency only by the schools.

The plan of organization involved (*a*) a general director, who is responsible for organization, propaganda, and administration, (*b*) regional directors who are charged with the responsibility of writing instructions upon gardening that will enable supervisors and teachers to take a garden company successfully through a season, even though not expert gardeners. These instructions have been put out in leaflet form and sent from the central office to all who applied for them. In a general way each regional director is considered responsible for the work in his territory.

The army plan of organization was adopted and has proved to be very popular and efficient. Simplicity of organization was desired, however, and but few of the divisions of the army were paralleled in the garden army plan.

A company consists of 150 garden soldiers as a maximum number. This number should be, and usually is, much smaller. Each company is entitled to a captain, and first and second lieutenant. A garden teacher is required for the company. The officers have been used to great advantage by many teachers in helping them on their reports, inspecting gardens, encouraging members of their company to do their full duty as true soldiers, and in arranging for exhibits, pageants, plays, etc.

To become an enlisted soldier in this army a pupil needs only to sign the enlistment sheet, which pledges him to do something that will help increase food production. No definite amount is specified but each is expected to do his part in helping fight the battles of democracy and freedom.

A bronze bar with the letters "U. S. S. G." upon it is given to each enlisted soldier. This is his badge of recognition by the Government at Washington. The badge of the captain has three small stars in the border, that of the first lieutenant, two, and of the second lieutenant, one. These little bars have greatly stimulated the interest children have taken in the work.

As this is fundamentally a school problem, the work should be provided for by superintendents and boards of education and financed by them from school funds. Not only is this as legitimate and as necessary for a well organized and administered school system as the teaching of any other branch, but to care for it at this time has become a patriotic duty. To lead boards of education to see it thus was the most important problem to be met. Success attained was very gratifying and promises for next year encouraging. Some cities have done remarkable garden work this season, and most cities are coming to see that the schools must assume full control of and responsibility for it to insure its full success and permanency.

Teachers prepared to teach gardening were difficult to find. Normal schools and colleges, with few exceptions, had not offered the work to those preparing to teach. It was necessary, therefore, to encourage the forming of special classes in gardening and to outline courses for them to pursue. Interest, however, was keen and the promise for next year is much better.

Through the generosity of Mr. Julius Rosenwald, of Chicago, who offered to provide one-half the salaries paid negro garden teachers in Southern States, a considerable number of southern cities were enabled to provide good supervision for the work of the colored children.

Rather than enrich and adjust the work of our schools we close them during the summer months. This makes supervision of garden work in summer difficult, and without supervision it will fail. The spirit of work to win the war has been strong, however, and probably by the time we have finished the war we shall have learned that school work, as other work, is as profitable in summer as in winter.

One million five hundred thousand boys and girls have responded to the call of the President and enlisted in the United States School Garden Army.

Twenty-five thousand acres of unproductive home and vacant lots have been converted into productive land. This will release an equal acreage now used in truck gardening for the production of other foodstuffs more important for war purposes. It will also relieve transportation congestion through home consumption of home produced foodstuffs.

Fifty thousand teachers have received valuable instruction in gardening through the garden leaflets written by experts in this office and distributed from here. Nearly one million five hundred thousand leaflets have been sent out.

Boards of education and other civic organizations have been influenced to give financial and moral support to the school and home garden movement and to pay extra salaries for supervision and teaching.

Hundreds of thousands of parents have become interested in the garden movement and are working with their children in home gardens. In Salt Lake City alone 5,200 mothers, representing 62 parental associations, are actively supporting food production through the schools.

Thousands of civic, commercial, and patriotic organizations have become interested in the movement and are giving it hearty support.

One and one-half million children have been given something to do this summer, something that will help carry the burden of their country in this struggle for freedom, something that will help them to build character and something that will appeal to and develop their patriotism.

Home and vacant lot gardening in cities, towns, and villages have been dignified and made popular to a degree that practically insures them a prominent place in the school system of our country. It would be difficult to estimate the educational and material value of such results. No other movement in history promises so much in aiding the "Back to the Soil" movement as this.

The work accomplished during the first few months has been so successful that the President has allotted the sum of $200,000 for the continuation of this work through the fiscal year ending June 30, 1919. Plans have been made whereby a much larger force of trained supervisors will be employed in the several regions into which the United States has been divided.

AMERICANIZATION.

The principal work of the Division of Immigrant Education has been to place Americanization before the country as a measure related to the war. The first step was to secure through the National Committee of One Hundred, an advisory council on Americanization to the Bureau of Education, a resolution from the Council of National Defense indorsing the Federal program of Americanization as being worked out by the bureau. This was done December 13, 1917. On February 12, 1918, the Council of National Defense joined with the bureau in putting forth a national plan of Americanization. This plan requested all State councils of defense to engage in Americanization work and to appoint Americanization committees and State directors of Americanization. Under this plan about 30 States were organized during the remainder of the fiscal year.

Under the joint plan as many State and local agencies as possible are being correlated and coordinated under the State councils of defense. The object is to avoid duplication of work and to effect the greatest unity of action possible. Every State council of defense and a large number of local and community councils have been supplied with the national plan and with all the special schedules of operation and circulars of information published by the bureau.

To assist in placing Americanization before the country as a war measure, the Secretary of the Interior called a conference on April 3 of all the governors, chairmen of State defense councils, and presidents of industrial corporations and chambers of commerce. About 300 persons attended this conference. Resolutions were adopted calling upon Congress to appropriate adequate funds to the respective Federal departments doing Americanization work, indorsing the principle of Federal aid in Americanization to States and communities, urging industrial and commercial organizations to cooperate with Federal and State authorities in a nation-wide plan, and recommending that all elementary instruction in all schools be conducted in the English language.

The clearing-house service has been considerably extended during the year. The variety of publications distributed covers a greater range. Over 100,000 circulars, news letters, schedules of operation, and schedules of standards and methods were sent out. Over 100,000 individual enrollment blanks were disseminated for the signature of individuals who desire to enroll in the Americanization campaign. About 25,000 bulletins, pamphlets, and other printed material were distributed, together with a large quantity of "America First" and flag posters.

The Advisory Council on Americanization, known as the National Committee of One Hundred, which was appointed by the Commissioner of Education, on September 1, 1916, has expanded its representation to include a greater number of industrial men and foreign leaders. Its activities now cover a larger field. Its principal activity during the past year has been the formulation of two bills, one working out the principle of Federal aid to the States for Americanization work and the other calling for funds to carry out the war Americanization plan. The legislative committee has spent a great deal of time and effort on these bills. The legislative committee also was instrumental in drafting and securing the passage of three bills in New York State providing for compulsory attendance of non-English-speaking persons between 16 and 21 years of age and providing for compulsory maintenance of educational facilities for their instruction and also for the training of teachers. A model bill for compulsory attendance has been drafted and furnished to several State school authorities and legislatures. The committee now has headquarters in New York City.

Special effort has been placed on the coordination and correlation of the varied activities of unofficial agencies, such as patriotic organizations, women's clubs, civic associations, fraternal orders, councils of defense, and Americanization committees. Special cooperative plans have been worked out with the American Bankers' Association, Scottish Rites, Pennsylvania State Department of Labor and Industry, National Committee of Patriotic Societies, Philadelphia Chamber of Commerce, and a great many other local chambers, with a large number of industrial corporations, with the New York State Department of Education and local superintendents of schools, and with about 25 patriotic societies and civic associations. The activities for many of these have been correlated with the national plan of Americanization as put out through the Council of National Defense.

Other activities include the preparation of over 15 new circulars of information and schedules of operation for official and unofficial agencies, and research into the educational activities of industrial corporations and chambers of commerce.

On May 2, 1918, the Secretary of the Interior accepted a proposition from the National Americanization Committee of New York for the extension of the bureau's work in Americanization with a special view to extending the work of education among the foreign-born population of the United States, in order to give them a knowledge of the industrial requirements in this country, of the history and resources of the country, of our manners and customs, and of our social, civic, economic, and political ideals, and through cooperation with loyal leaders of racial groups to win the full loyalty of these people for the United States and their hearty cooperation in the war for freedom and democracy. Under the plan of cooperation adopted the National Americanization Committee bears the additional expense for salaries and travel of specialists, assistants, clerks, and other employees, as well as the necessary expenses for office equipment. All employees are selected by the Commissioner of Education and appointed by the Secretary of the Interior. Some of the immediate objects of this new work are the following:

1. To give the immigrant better opportunities and facilities to learn of America and to understand his duties to America.
2. To unite in service for America the different factions among the several racial groups and to minimize in each race the antagonism due to old-country conditions.
3. To cement the friendships and discourage the enmities existing among races and to bring them together for America.
4. To bring native and foreign born Americans together in more intimate and friendly relations.
5. To give native-born Americans a better understanding of foreign-born Americans.
6. To develop among employers a more kindly and patriotic feeling toward foreign-born workmen.
7. To encourage the foreign-born Americans to assist in the work of Americanization and to develop a more patriotic feeling toward the work in which they are engaged.
8. To develop the school as the center for Americanization work for all alike.

MAINTAINING SCHOOLS.

Probably the most important work of the bureau in connection with the war has been, first, in keeping before the people, and especially before officers of colleges, universities, and technical schools the necessity of maintaining a supply of educated and trained men and women for direct or indirect war service, and, second, in bringing the people of the country at large to understand that it is the desire of the administration that the schools and other agencies of education shall be maintained as nearly as possible at their normal efficiency during the war and that, in so far as may be, there shall be no falling off of attendance in the schools of any grade, and in making sentiment sufficiently strong to maintain this policy. To this end many thousands of copies of scores of letters and circulars of information and appeal have been sent to governors of States, mayors of cities, boards of trade, officers of labor organizations, women's clubs and civic bodies, and State, county, and local school officers, officers of colleges, universities and technical schools, and the public press. Ministers have been asked to present the cause of education from their pulpits and otherwise, the cooperation of Chatauqua lecturers has been enlisted, and many conferences and public meetings have been held. Advice and counsel have also been given in regard to the reorganization of schools, and changes in schedules and courses of study to meet the demands of the war emergency. Legislatures and municipal tax-levying bodies have been urged to make provision for such increase in school funds as is needed to meet the necessary increase in the wages of teachers and other expenses on account of the increase in the cost of living and the wages paid for labor and other forms of service. All this has been done "to the end that no boy or girl shall have less opportunity for education because of the war, and that the nation may be strengthened, as it can only be through the right education of all its people."

The response of the people and their representatives in all parts of the country has been gratifying. The efficiency of the schools has been maintained in a larger degree than was expected by most. There has been little falling off in attendance. Appropriations for salaries of teachers have been increased in many States and cities. Although many teachers have gone into the Army or the war industries, a large majority have remained at their posts as a patriotic duty, regardless of the temptations to much higher pay elsewhere.

RECONSTRUCTION.

The bureau has also not been unmindful of the importance of collecting information and making such studies as may be helpful in the readjustment or reconstruction of our systems of education after the war. For this purpose several important studies have been begun of conditions both in this country and abroad. Special conferences have been held and the bureau is cooperating with the American Council of Education and other organizations interested in this matter.

The bureau should have done much more work in both these catagories than it has been able to do because of lack of funds. Because of this, many other agencies have taken up fragments of this work, usually much less effectively and at a greater cost than would have been necessary could it all have been centered in this bureau.

INVESTIGATIONS, CONFERENCES, AND PUBLICATIONS.

Other activities which may be classified under the above heading have been carried on by the several divisions of the bureau.

HIGHER EDUCATION.

Two bulletins have been completed and put through the press: "Statistics of State Universities and State Colleges," and "Accredited Higher Institutions." The first report of the Committee on Higher Educational Statistics, on standards and resources of colleges of liberal arts, was prepared by the specialist in higher education, as secretary of the committee, and has been transmitted for publication. Further work on the study of correspondence schools, which was begun the previous year, was carried on and Part I of the study completed. The reports of the land-grant colleges have been audited and tabulated, and are ready for the press.

The specialist in higher education has visited and inspected the facilities for technical training of ten institutions in connection with his work on the Committee on Education and Special Training.

At the request of The Adjutant General of the Army, the division passed upon the eligibility for accrediting by the United States Military Academy of 536 institutions.

SCHOOL ADMINISTRATION.

The principal work accomplished in the field of general school administration, aside from surveys, consisted of a bulletin on summer sessions in city schools, a digest of State laws relating to libraries, and a digest of educational legislation enacted in 1916 and 1917. The history of education in Arizona was completed and issued as Bulletin 1918, No. 17. Projects under way include a bulletin on reading, the preparation of a course of study for the first grade, an investigation of the causes which lead to failures and nonpromotion in the first grade, and an investigation of the extent of the use of activities in the primary school.

SCHOOL HYGIENE AND SANITATION.

A conference on physical education was held at Atlantic City, N. J., under the auspices of the bureau on February 26, 1918, which resulted in the adoption of a program calling for Federal legislation for the promotion of physical education. With the cooperation of a committee of the American Public Health Association an investigation of "School Closing as a Means of Combating Epidemics" has been begun. There is also in course of preparation a bulletin which will contain a detailed program for schools not having expert teachers of physical training.

The services of the special agent in school-house construction and sanitation are frequently sought by school boards to assist them in planning school buildings. For this purpose he visited during the year the cities of Memphis, Tenn., Montgomery, Ala., Richmond, Ky., and Little Rock, Ark. In other cases advice was given through correspondence.

AGRICULTURAL EDUCATION.

Three studies have been carried to completion by this division.

1. Study of organization and administrative relationship of the colleges of agriculture.

This study was conducted mainly by the questionnaire method, but much information was obtained through the several inspectors of the States' Relations Service. From the information obtained a statement of the findings and 14 recommendations were presented to the committee on college organization and policy of the Association of American Agricultural Colleges and Experiment Stations. The recommendations were approved and incorporated into the committee's report which was adopted by the association. These recommendations in elaborated form have been published as Higher Education Circular No. 8, 1918.

2. Investigation of the work of the land-grant colleges in the training of teachers for vocational subjects.

This inquiry consisted in the sending of a questionnaire to each college and a careful examination of the college catalogues from which a statement concerning each institution was prepared. These statements formed the basis of several tabulations and summaries. The report on this investigation has been presented and published as Bulletin, 1917, No. 38.

3. Study of the organization for instruction and the requirements for admission and graduation of the several agricultural colleges.

Progress has been made in the preparation of a reading course in agriculture and country life.

VOCATIONAL EDUCATION.

Conferences of specialists in the preparation of teachers for industrial schools were held at the University of Missouri, Columbia, Mo., and at Philadelphia, Pa., and reports of the deliberations were prepared and distributed. The division also prepared and distributed reports of the following conferences: (1) Government policies involving the schools in war time; (2) science and industrial arts in secondary schools; (3) scientific and industrial training in the war emergency. Five letters in the "Vocational Education Letters" series were issued. The "Directory of Vocational Education" was revised. Chapters on "Manual Training" and "Vocational Education" were prepared for the report of the Elyria (Ohio) survey.

Both specialists in home economics have rendered assistance to the Food Administration and to the American National Red Cross. Conferences of supervisors of home economics in the public schools were held in Portland, Oreg., and in New York City, to assist in adjusting the courses in home economics to war conditions.

About one-half of the time of the specialists in industrial education and home economics was devoted to the holding of conferences, to delivering lectures on vocational subjects, and to work on school surveys.

The division also prepared and issued the following material relating to home economics:

Bulletin, 1917, No. 23. Three short courses in homemaking—care of the home, cooking, sewing.

Bulletin, 1917, No. 47. The preparation and preservation of vegetables.

Six "Home Economic Circulars":

1. Teaching home economics under present economic conditions.
2. Current problems in home economics.
3. Home economics in small high schools.
4. Principles and policies in home economics education.

5. Government publications of interest to home economics teachers and students.

6. A course in home economics for the housekeeper.

Eleven letters in the "Home Economics Letters" series.

A bibliography of home economics.

RURAL EDUCATION.

The rural education division has carried forward during the year several definite educational projects in addition to the surveys and war work described elsewhere.

Work has been continued on the rural-school course of study by the specialists of the division, working in cooperation with a corps of educators representing the different sections of the country. This work is now taking on a definite form in preparing subject material for the reorganized course of study that is essential to the welfare of the agricultural sections of the country. The background of the course of study, resting on health and home sanitation, has been completed.

The 1916-1918 series of the National Rural Teachers' Reading Circle was completed in September of the present year. Forty-six members from 34 different States have completed the work of the course and have received the reading-circle certificate issued by the Commissioner of Education. One hundred and nineteen other members are due to receive this certificate before the close of the calendar year. The value of the reading-circle work has been attested to by many State and county school officials throughout the country.

Assistance has been rendered to State school officials in New Mexico in formulating new school legislation; in Arkansas in the revision of constitutional provisions relating to education and revision of the State school code; and to the school officials of West Virginia in revising the school code of that State.

Other specific projects under way are the following:

1. A study of rural-school consolidation in the United States and Canada. This work is done in cooperation with representatives from the State departments of the several States and the departments of education of the Canadian Provinces. The study includes, in addition to general statistics of the 48 States and 9 Canadian Provinces, intensive studies of 15 counties chosen as typical in the different sections of the country, and also specific studies of typical consolidated schools in many States and Provinces.

2. A study of rural high-school education with special reference to junior high-school organization.

3. A study of the immediate problems in rural education, what principles should govern their solution, and what steps should be taken toward meeting them. This work is going forward in cooperation with the National Country Life Commission. The purpose of the work is to prepare a statement of the whole rural educational problem, including references to easily available literature on the subject, for the use of school officials, rural high schools, granges, rural women's clubs, farm bureaus, and other country organizations.

4. A study of teacher certification in the United States.

5. A study of the minimum requirements of the ideal one-teacher community school.

The campaign for the improvement of rural-school conditions was continued during the year. Besides addresses delivered before State and sectional teachers' associations and conferences throughout the country, important sectional conferences were held by specialists of the division at St. Paul, Minn., August 27 to September 3, 1917; at Hot Springs, Ark., November 12 to 14, 1917; Denver, Colo., November 22 to 24, 1917; at Butte, Mont., November 26 to 28, 1917; and at Chico, Cal., December 3 to 5, 1917. These were followed by a national conference on rural education and country life held at Washington, D. C., February 19 to 24, 1918.

COMMERCIAL EDUCATION.

With the cooperation of the Association of Urban Universities, the Bureau of Foreign and Domestic Commerce, and local committees in the selected cities, arrangements have been made for an investigation as to the need for trained service in the conduct of foreign trade and to determine how the schools and colleges can best meet that need. This investigation will cover the cities of Boston, New York, Philadelphia, Baltimore, Rochester, Pittsburgh, Cleveland, Akron, Cincinnati, New Orleans, St. Louis, Chicago, Seattle, Portland, and San Francisco. Plans are now being made to carry on a similar investigation of all cities in the United States having more than 25,000 inhabitants.

There were prepared and distributed courses of study in commercial education for use in elementary schools, high schools, colleges, universities, and private business schools.

KINDERGARTEN EDUCATION.

Three studies in kindergarten education have been completed—a circular dealing with methods of organizing kindergarten classes in city school systems; another containing practical suggestions for kindergarten and primary teachers with regard to social guardianship of young children during the war; and the third giving a review of recent publications of special interest to kindergartens. Other studies now in progress are: Conditions governing the certification of kindergarten teachers in the several States, a suggestive kindergarten curriculum, and the preparation of sets of standard scales and tests pertaining to certain types of kindergarten activities. A demonstration kindergarten under the supervision of the bureau was conducted in Hyattsville, Md., for the purpose of encouraging the extension of kindergartens in that State and for testing certain principles of kindergarten teaching.

During the year a series of 55 articles on kindergarten methods for mothers has been issued to the newspapers of the country. More than 2,000 newspapers and magazines, having an aggregate circulation of 32,000,000 have asked for these articles, and they are published every week in practically every large city in the country. In addition, copies have been sent upon request to 15,000 mothers, 1,000 kindergartners, 1,000 presidents of women's clubs, and 1,500 home demonstration agents. These articles were prepared by mothers who were formerly kindergartners. The eagerness shown on all sides for help of this kind has been so impressive that material is now being collected for another series which will include articles for fathers.

Correspondence with the people of the various States advising them of the kindergarten legislation enacted in five States last year has resulted in 18 other States starting educational campaigns with a view to working for better laws when their legislatures convene in 1919.

The following results are typical illustrations of the advantages of petition laws now in operation in California, Oregon, and Texas.

In California, since the enactment of their law, over 300 additional public-school kindergartens have been opened. Through the work of a special collaborator in that State the mothers continue to petition for kindergartens, and during the past year more than 45 of these classes have been opened.

Up to 1917, the year the kindergarten law was enacted, Oregon was the only State in the Union having no public school kindergartens. As soon as the law was passed the board of education in Portland opened four kindergartens, which have been so successful that several others will be started during the coming year.

The board of education of Dallas, which previous to the enactment of the Texas law in 1917 had no public-school kindergartens, immediately opened 13 classes. A special collaborator is conducting a correspondence campaign in this State, informing mothers of the provisions of the law and urging them to petition for classes.

The series of letters to kindergartners has been continued. More than 60,000 leaflets dealing with different phases of the kindergarten have been sent in response to requests coming from all parts of the country.

During the summer of 1917 a series of lectures, illustrated by lantern slides and demonstrated with kindergarten materials, was given in several State normal schools in Maine. Typed lectures and slides were also sent to normal schools and universities in Tennessee, North Carolina, Virginia, South Dakota, Missouri, North Dakota, and Louisiana. An exhibit was prepared and sent to the Exposition of the Civic Federation at Dallas, Tex.

A campaign to have a kindergarten established in every public school, and especially in communities where there are large numbers of aliens, is now being carried on. A leaflet containing suggestions for the conduct of this work has been prepared, and 20,000 copies have been distributed.

HOME EDUCATION.

Two additional courses were prepared and added to the list of home reading courses issued by the bureau, namely, No. 7, Thirty World Heroes, and No. 9, Thirty American Heroes. More than 7,000 readers are now enrolled in the National Reading Circle, and 160 readers have finished one or more of the courses and have been granted certificates. State and local libraries continue to cooperate in this work by giving publicity to the courses and by loaning books included in the courses. An addressograph mailing list has been prepared, which includes approximately 7,000 parent-teacher organizations.

CIVIC EDUCATION.

The specialist in civic education assisted the Massachusetts State board of education in putting into effect a new law requiring "training in the duties of citizenship" in all the schools of that State. For this purpose he was lent to the State for a period of three months, during which time he prepared two bulletins on citizenship which were issued by the State board of education, held conferences in all parts of the State with teachers and school officers, conducted two training courses for teachers and principals on the subject of civic education, and advised with committees on the reorganization of courses of study in elementary and junior high schools.

COMMUNITY ORGANIZATION.

A considerable amount of time was given by the specialists in community organization to the inauguration in the District of Columbia of community centers and community buying clubs at various schoolhouses. There is a great demand throughout the entire country for information and advice regarding various phases of community organization, and the specialists have given numerous addresses on the subject in compliance with requests received from educational institutions and civic organizations. A number of educational institutions are now giving courses of instruction in the subject. During the year a bulletin 1918, No. 11, entitled "A Community Center—What it is and How to Organize It," has been prepared and printed and 12,000 copies of it have been distributed.

NEGRO EDUCATION.

The work during the year for negro education may be summarized as follows: Development of cooperation between public and private agencies; cooperation of State, county, and city officials, North and South, in all movements to promote the education of the Negro; furnishing information on the educational phases of the race problem; influencing northern donors to give money only to worthy schools; exposing fraudulent negro schools; bringing to the attention of the public the inadequate provision made for negro education; assisting the negro schools in the matter of curriculum, accounts, and buildings. One member of the division who is trained in accounting and business management gives all his time to the improvement of accounts and records in the schools. The systematic help planned for the schools will not only effect important economies, but also greatly increase and improve the educational efforts of these schools.

In August, 1917, an important conference on negro education was held in the auditorium of the Interior Department Building in Washington. In accordance with resolutions adopted by the conference the Commissioner of Education appointed a Committee on Negro Education, consisting of representatives of church boards of various denominations that maintain schools for Negroes, the public school systems of the Southern States, the independent schools not connected with any church board and unaided by the State, the State agricultural and mechanical colleges for Negroes, and the educational funds for negro education. One meeting of the committee and three meetings of subcommittees have been held. These subcommittees have prepared reports on educational standards, financial aid, and cooperation of private agencies. Other subcommittees are considering questions of increased support for the public schools and the cooperation of public and private agencies.

ALASKA.

During the year the field force of the Bureau of Education in Alaska consisted of five superintendents, one assistant superintendent, 116 teachers, 9 physicians, and 11 nurses. Sixty-nine schools were maintained with an enrollment of 3,700.

School buildings were erected at White Mountain, whither the Eskimos had migrated from Council; at Elim, within a tract on Norton Sound which had been reserved by Executive order for the use of the Eskimos formerly inhabiting the village of Golovin; at Fort Yukon, to replace the school building which the erosion of the river bank had rendered unsafe; at Tyonek, where the small log building hitherto used for school purposes had proved inadequate; at Metlakatla, a residence was erected for occupancy by the principal teacher.

The wisdom of the policy of setting aside selected tracts within which the natives can readily obtain fish and game and advantageously conduct their own enterprises has again been demonstrated by the success of the colony at Noorvik, in Arctic Alaska. With their advancement in civilization, the Eskimos living at Deering, on the bleak sea coast, craved a new home. Lack of timber compelled them to live in the semiunderground hovels of their ancestors, while the killing off of the game animals made it increasingly difficult for them to obtain food. An uninhabited tract on the bank of the Kobuc River, 15 miles square, abounding in game, fish, and timber, was reserved by Executive order for these Eskimos and thither they migrated with their household goods and herds of reindeer. On this tract in the Arctic wilderness, the colonists under the leadership of teachers, have built a village with well-laid-out streets, neat single-family houses, gardens, a mercantile company, a sawmill, and electric light plant, and a wireless telegraph station which keeps them in touch with the outside world.

Affairs at Metlakatla, on Annette Island, have made satisfactory progress. The legality of the Annette Island Fishery Reserve having been reaffirmed by the Circuit Court of Appeals, definite plans for the development of the colony have been carried into effect. By a lease dated April 30, 1917, the Secretary of the Interior, on behalf of the Metlakatlans, granted to the Annette Island Packing Co., of Seattle, fish-trapping privileges within the reserved waters adjacent to Annette Island and permission to erect and operate a cannery on Annette Island. For these privileges the lessee guaranteed the payment of not less than $4,000 during the season of 1917 and of not less than $6,000 per annum for five years beginning with 1918. It is expected that the revenue accruing from this lease will enable the Secretary of the Interior to take over, for the Metlakatlans, the property of the lessee within the reserve and to arrange for the operation of the cannery by the natives themselves.

During the summer of 1917 the Annette Island Packing Co. expended $7,657.14 in the construction of cannery buildings; the royalties amounted to $4,801.95, leaving a balance of $2,855.19 to the credit of the company at the close of the season.

In May, 1916, representatives of the bureau of education succeeded in organizing among the natives the Metlakatla Commercial Co., with a capital of $2,255 and 30 shareholders to conduct the mercantile business of the settlement. The auditing of the affairs of the company in January, 1918, showed a capital of $14,985 at that date and a net profit of $4,033.30 for the year. The number of stockholders had increased to 110. In addition, the company had rehabilitated and operated the sawmill and had furnished lumber for the cannery buildings and for other buildings in the village.

The income and wages resulting from the cannery lease, guaranteed through five successive years, and the prosperity of its commercial company, assure the economic restoration of the Metlakatla colony.

Economic conditions among the natives of Alaska have been greatly affected by the war. While the prices received by the natives for their furs have fallen below normal, the cost of food, clothing, and manufactured articles imported from the States has increased as much as 300 per cent. The Bureau of Education has, therefore, through the agency of its teachers, urged the natives to live, as much as possible, independently of imported articles and to depend upon native products, not only for their own benefit but also for the assistance they can thereby render the country in conserving its food supply. New impetus has been given to the endeavor of the Bureau of Education to train the natives in the raising of vegetables for their own use and for sale. Efforts in this direction have produced encouraging results, especially in the upper Yukon, Kuskokwim, and Kotzebue sound regions.

In widely separated parts of Alaska the natives have shown their gratitude to the Government, which has done so much for them, by zealously cooperating in activities which will help to win the war; they have willingly complied with the requests of the Territorial food administrator, liberally purchased Liberty bonds and war savings stamps, organized branches of the Red Cross, formed knitting and sewing societies in many villages, and contributed toward the support of the "Alaska bed" in one of the American hospitals in France.

Congress appropriated $62,500 for the support of the medical work of the bureau among the natives of Alaska during the fiscal year 1917–18. Nine physicians and eleven nurses were employed; hospitals were in operation at Juneau, Nulato, and Kanakanak; as heretofore, medical supplies were sent to teachers remote from a hospital, physician, or nurse, for use in relieving minor ailments.

During the year the building at Kanakanak, erected as a school building in 1909, was enlarged and remodeled for hospital purposes; the hospital building at Akiak, begun in 1917, was completed.

At the Juneau hospital the policy was inaugurated of receiving native girls for theoretical and practical training as nurses. This action will result in the training of a considerable number of girls who will render effective service in improving the health and in raising the standard of living in the native villages to which they return.

As the natives of Alaska advance in wealth and independence, it is natural that they should wish to assume part of the expense of their medical service. The honor of taking the first step in this direction belongs to the natives of Hoonah, who during the latter part of the year paid the salary of a physician and started a fund for the erection of a hospital in their village.

Pending the time when the congressional appropriations will permit the bureau to assume the entire expense of the medical care of the natives in southeast Alaska, the Commissioner of Education entered into an agreement with the Woman's Board of Home Missions of the Presbyterian Church by which the board assumed the entire responsibility for the medical work in the villages of Klawock and Hydaburg and agreed to rent to the bureau its hospital building at Haines for use as a tuberculosis sanitarium, the board also assisting in the maintenance of the sanitarium during the first year.

The reports from the reindeer stations for the fiscal year ended June 30, 1917, the latest complete information received, show a total of 98,582 reindeer distributed among 98 herds. Of the 98, 582 reindeer, 67, 448, or 69 per cent, were owned by 1,568 natives; 3, 046, or 3 per cent, were owned by the United States; 4, 645, or 5 per cent, were owned by missions; and 23,443, or 23 per cent, were owned by Lapps and other whites. The total income of the natives from the reindeer industry during the fiscal year was $97,515. The total number of reindeer, 98,582, is a net increase of 20 per cent during the year, notwithstanding the fact that 13,144 reindeer were killed for meat and skins or were lost.

Reindeer fairs, or conventions, were held during the winter at Igloo, on Seward Peninsula; at Unalakleet, in the Norton Sound region; at Noatak, in the Kotzebue Sound district, and at Noorvik, on the Kobuk River. These annual fairs have become a recognized feature of the reindeer industry; they bring together Eskimos from a large extent of country who spend a week together thinking about and discussing not only subjects relating to the reindeer industry but also matters of importance affecting the Eskimos as a race. The competitions and exhibits promote interest in the various phases of the work; comparison of methods results in increased efficiency; personal intercourse makes for good fellowship and develops leaders who are recognized as such by the Eskimo themselves. An important result of the fairs was the organizing in northwestern Alaska of the Eskimo Reindeer Men's Association, the object of which is to awaken the natives to their own responsibilities and to secure united sentiment and action in important matters affecting the Eskimo race.

MEETINGS AND ADDRESSES.

While the greater part of the bureau's contribution to the progress of American education must be given through the medium of the printed page, the small travel expense fund has made it possible for the bureau to comply with a very limited number of the many requests that have come to it for addresses on educational subjects. In a considerable number of cases associations and institutions desiring the services of specialists were able to defray the expenses incurred by specialists and thus made it possible for the bureau to comply with their requests for addresses. A much larger appropriation for traveling expenses is absolutely necessary to enable the bureau to serve the entire country without partiality.

CIRCULAR LETTERS AND LEAFLETS.

The services rendered through multigraph letters and printed leaflets has been largely extended during the year and has now become one of the bureau's most effective means of disseminating information in regard to education. Since the close of the fiscal year this service has been supplemented and to an extent consolidated through the publication of a semimonthly journal under the title of School Life, which is sent to about 40,000 school officers.

REPORT OF THE COMMISSIONER.

Because of the impossibility of having the annual report of the Commissioner of Education in the extended form of two volumes, one volume an interpretative survey of the progress of education within the United States and elsewhere, the other a statistical summary of education in the United States, ready by October 15 as now required by law, the form of the annual report has been changed to one small volume of approximately 100 pages setting forth the activities of the bureau and their results, together with a very brief summary of the most important educational events of the year. This is believed to be more nearly what was intended by the act creating the bureau. The information heretofore given in the annual report will be published in the future every second year in a biennial survey of education of two volumes of the approximate size and form of the two volumes of the annual reports as heretofore printed.

MISCELLANEOUS.

The bureau has definitely undertaken the task of coordinating its own statistical work with that of the several State departments of education with the hope of increasing the value of both its own statistical reports and those of State departments and at the same time of relieving school officers of the burden of making two reports, one to the States and the other to the United States in different form. For the promotion of this work of coordination a director of statistics has been appointed who will have the assistance of a committee of State school officers appointed by the national association of State superintendents.

Within the year the division of immigrant education maintained in cooperation with the National Americanization Committee has been enlarged by the addition of a war work extension service section with officers both in Washington and New York City. The two sections are about to be consolidated under one head to assist in the work of the division. A semimonthly publication is planned under the title of Americanization Bulletin.

Through an increase in the appropriations to the Bureau of Education Congress has made possible an increase in the personnel of the division of school sanitation and hygiene and in the kindergarten division, which is maintained with the cooperation of the National Kindergarten Association and the International Kindergarten Union, and the creation of a division of city school adminstration which will enable the bureau to render more effective aid to officers and teachers of city schools. It has also been possible to strengthen the work of community organization.

Some relief has been given by a small increase in the clerical staff of the bureau, but this increase is almost insignificant when compared with the increased clerical help needed. The correspondence of the bureau for instance has increased since 1910 by approximately 1,000 per cent, but the appropriation for stenographers and typewriters has increased only about 50 per cent. The increased need for statistical clerks and help in the editorial division and division of mails and files has been equally great, but the increase in clerks for these divisions has been even less than in stenographers and typewriters.

The bureau is still greatly handicapped in its work of dissemination of information both by the restrictions on printing and by lack of sufficient funds for traveling. The number of persons interested in the bulletins and other publications of the bureau has increased very largely since the limits of printing were fixed by law and this service becomes relatively more inefficient every year. As to the need for more funds for traveling I quote from the Statement of the Commissioner of Education for the fiscal year ended June 30, 1917:

> The need for a larger amount of funds for the payment of traveling expenses of specialists in the bureau continues. It is clearly evident that the bureau can never serve the educational interests of the country effectively so long as its specialists depend on local communities and institutions which they visit to pay all or most of their expenses for travel and subsistance. As pointed out in a previous statement, this can only result in a discrimination against those communities and institutions most needing the help of the bureau. The allowance for travel should be several times greater than it now is.

The appropriation for travel for the present fiscal year is only $5,000. Not less than $25,000 is needed.

The amendment to the appropriation bill for the fiscal year ended June 30, 1918, makes illegal, after June 30, 1919, the present plan of cooperation by which the kindergarten division is partly maintained and by which the divisions of negro education, home education, and Americanization are wholly maintained. The work of the bureau and the cause of education would be greatly injured by any decrease in the personnel of the kindergarten division or the discontinuance of any of the other divisions. Appropriations should therefore be made by Congress for their maintenance.

In regard to the need for an increase in the personnel of the bureau and for such a salary scale as will enable it to obtain the continued services of men and women of the largest ability, I quote from the Statement of the Commissioner of Education for the fiscal year ended June 30, 1917, the first part of which is repeated from a previous statement:

> In many of the most important phases of education the bureau is able to render little or no service, because it has in its employ no persons with special knowledge of them. In none can it serve fully and effectively, because in no division of the bureau dealing with the principles of education and their practical application is there a sufficient number of specialists to enable the division to respond to more than a very small number of the demands made upon it. If the bureau is to render the service which the country expects of it, and which it should render for the promotion of the cause of education throughout the country, not only must it have on its staff a much larger number of experts in various lines of educational work, but it must be able to pay them larger salaries. The salaries now paid for expert service in the bureau are lower than are paid for corresponding grades of service in other Government bureaus and much less than is paid for work of a lower grade in State, county, and city school systems.

There can be no question that the agency on which the Federal Government depends for the stimulation and guidance of the most important interests of the Republic, the right education of its children and youth, on which all else depends, should be fully and adequately equipped for its work. This kind of work had better not be done at all than not done well.

Practically all the needs of the bureau set forth in the statement of the commissioner for the last two years still exist. The rapid movement of events within these years has created and brought to light others equally important.

The demands on the bureau for help in the readjustment and extension of education in the period of reconstruction following the war will be much greater than they have ever been. If it is not able to respond to these demands they must be met otherwise and probably at much greater cost. I therefore beg leave to submit again with some slight modifications and additions the recommendations previously submitted.

RECOMMENDATIONS.

1. An increase in the salaries of chief clerk, editor, statistician, specialist in land-grant college statistics, specialist in higher education, and other specialists, and the removal of the limit on amount of salaries which may be paid from the lump-sum appropriations for rural education, industrial education, and school sanitation and hygiene and for other purposes. The duties of these positions require the services of men and women of such kind and degree of ability as demand salaries considerably higher than are now paid in this bureau.

2. An assistant commissioner. The duties of the office make it necessary for the commissioner to visit distant parts of the country and to be absent from the office frequently many days at a time. There should be an assistant commissioner to carry on the work in the office during his absence and to relieve him of much of the routine work of the office, so that he may be able to give more time and attention to the larger problems of education and to direct more effectively the more important work of the bureau.

3. Additional specialists in higher education, including education in universities, colleges, schools of technology, schools of professional education, and normal schools. The constant and increasing demands from these schools for the help of the bureau in making surveys and for advice as to their reconstruction and better coordination are larger and far more numerous than it can meet with its present force. There is special need of an able man, familiar with agricultural education and the problems of negro education in the South, to devote his entire time and attention to the colleges of agriculture for Negroes in the Southern States. Such a man might easily make the use of the $1,109,198 by these schools, of which $282,121 are appropriated by the Federal Government, from 25 to 50 per cent more effective than it now is.

4. A much larger appropriation for the division of school directed home gardening. The proper education of many millions of children, and even the possibility of their attending school at all during the years in which attendance at school is most valuable, depend to a very large extent upon the general adoption of the work which the bureau is promoting through this division. It is very important that there should be in the bureau a sufficient number of specialists in this subject to visit all cities, towns, and manufacturing villages in the country, advise with their school officials and teachers, and assist

in directing the work of teachers until the plan is well enough understood and there are enough trained teachers so that the work in any city or town may go on without outside direction, or until the several States have made provision for the direction of the work from their offices of education. The enactment of child-labor laws prohibiting the employment of children under 14 years of age in mills, mines, and quarries must result in enforced idleness of hundreds of thousands of boys and girls and in unnecessary hardships to them and their parents unless there be found for them some form of suitable employment economically profitable and at the same time educational. Results obtained through home and school gardening confirm the belief that both economically and educationally this is one of the very best forms of employment for children between the ages of 8 and 14 years. The demand for increase in food production because of the war emphasizes the economic importance of this. Results of the increased work of this division made possible by an allotment from the appropriation for the National Security and Defense of $50,000 for the last quarter of the fiscal year ended June 30, 1918, and an allotment of $200,000 for the current fiscal year show most clearly its value for production and education. If this work can be continued on this scale for a few years more it is believed that it will come to be recognized as an essential part of the school work of cities, towns, and industrial villages, thus enriching the educational life of boys and girls of these communities by an element otherwise impossible for them.

5. An increase in the number of specialists and assistants in rural education and industrial education. The few specialists now employed in these subjects are wholly unable to do more than a mall part of the work needed. States are asking for expert advice in regard to school legislation and the improvement of their school systems. States, counties, and local communities want comprehensive and detailed school surveys. There is need and demand for such general and authoritative studies of school administration, courses of study, methods of teaching, and adaptation of the work of the schools to the life and needs of the communities which they serve as can be made effectively only by a large group of men and women of the best ability working under the direction of the Federal Government. The passage of the Federal vocation act, the so-called Smith-Hughes Act, and the creation of the Federal Board for Vocational Education relieves the Bureau of Education to a certain extent of responsibility in regard to vocational education in certain classes of schools and for certain classes of persons, but at the same time it emphasizes the importance of the work which the bureau should do for vocational education in other schools and for other classes of persons.

6. The addition of two or three specialists to the division of commercial education for the investigation of problems of commercial education and to assist in making plans and finding means for the preparation of our young people for participation in the larger commercial life upon which the country is now entering. The rapid expansion of the foreign commerce of the United States, because of the war and for other reasons more permanent, makes the needs of this division more pressing than when it was first recommended some years ago.

CIVIC EDUCATION.

The specialist in civic education assisted the Massachusetts State board of education in putting into effect a new law requiring "training in the duties of citizenship" in all the schools of that State. For this purpose he was lent to the State for a period of three months, during which time he prepared two bulletins on citizenship which were issued by the State board of education, held conferences in all parts of the State with teachers and school officers, conducted two training courses for teachers and principals on the subject of civic education, and advised with committees on the reorganization of courses of study in elementary and junior high schools.

COMMUNITY ORGANIZATION.

A considerable amount of time was given by the specialists in community organization to the inauguration in the District of Columbia of community centers and community buying clubs at various schoolhouses. There is a great demand throughout the entire country for information and advice regarding various phases of community organization, and the specialists have given numerous addresses on the subject in compliance with requests received from educational institutions and civic organizations. A number of educational institutions are now giving courses of instruction in the subject. During the year a bulletin 1918, No. 11, entitled "A Community Center—What it is and How to Organize It," has been prepared and printed and 12,000 copies of it have been distributed.

NEGRO EDUCATION.

The work during the year for negro education may be summarized as follows: Development of cooperation between public and private agencies; cooperation of State, county, and city officials, North and South, in all movements to promote the education of the Negro; furnishing information on the educational phases of the race problem; influencing northern donors to give money only to worthy schools; exposing fraudulent negro schools; bringing to the attention of the public the inadequate provision made for negro education; assisting the negro schools in the matter of curriculum, accounts, and buildings. One member of the division who is trained in accounting and business management gives all his time to the improvement of accounts and records in the schools. The systematic help planned for the schools will not only effect important economies, but also greatly increase and improve the educational efforts of these schools.

In August, 1917, an important conference on negro education was held in the auditorium of the Interior Department Building in Washington. In accordance with resolutions adopted by the conference the Commissioner of Education appointed a Committee on Negro Education, consisting of representatives of church boards of various denominations that maintain schools for Negroes, the public school systems of the Southern States, the independent schools not connected with any church board and unaided by the State, the State agricultural and mechanical colleges for Negroes, and the educational funds for negro education. One meeting of the committee and three meetings of subcommittees have been held. These

9. The establishment of a division, with specialists and assistants, for the investigation of the education of exceptional children. There are in the United States more than 2,000,000 children whose education requires means varying widely from those in common use for the education of normal children. These children are to be found in cities, towns, and rural communities alike, and all school officers and teachers have to deal with them. The Bureau of Education can not be considered as performing its duties to all the population with impartiality until it has in its service men and women who can give accurate information and helpful advice in regard to the education of these children.

10. Provision for the investigation of the education of adult illiterates and the dissemination of information as to the best methods of teaching illiterate men and women to read and write, and of extending the meager education of those who were denied the advantages of the schools in their childhood and youth. According to the census of 1910, there were in the United States more than 5,500,000 illiterate men and women and children over the age when they may be expected to make a beginning in the public schools, and there were many millions more barely able to read and write. This illiteracy is a burden to society and a menace to State and Nation. Within the past few years much interest in the removal of this burden has developed. The response to the little attention which this bureau has been able to give to this subject indicates that States, local communities, individuals, and benevolent societies are ready to cooperate heartily with the Federal Government in any reasonable plans which may be devised and presented for this purpose.

11. A careful and thorough investigation as to the means of better education of children in their homes, and the dissemination of information as to the best methods for the early physical, mental, and moral education of children in the home, and for the better cooperation of home and school in the education of children of school age. Children of the United States are in school less than 4 per cent of their time from birth to 21. The home is the primary and fundamental educational institution. Schools and other agencies are only secondary. If education in the home fails, no other agency can make good the failure. With our changing civilization and social and industrial life, there is need for more careful study of education in the home. The bureau has already made a beginning in this work, with the cooperation of the National Congress of Mothers and Parent-Teacher Associations. This should be continued and enlarged through congressional appropriation.

12. An assistant editor. The editorial work of the office has increased more than sixfold within the past seven years, and it must increase still more within the next few years. It is now impossible for one editor to perform satisfactorily all the required editorial work. The more careful editing of the reports and bulletins of the bureau which this addition to the editorial staff would make possible would save each year in the cost of printing much more than the salary of an assistant editor.

13. A specialist in foreign and domestic systems of education and an assistant in foreign systems of education. This bureau is undertaking to keep the people of the United States informed as to all

important progress in education and in methods of teaching in all countries of the world. The radical revolution in education in most countries which will follow the close of the war and which has already begun in several of the more important nations, makes it imperative that this work be done thoroughly and well; if it is not, the educational interests of this country will suffer great and irreparable loss. It can not be so done without the additional assistance indicated.

14. Two additional collectors and compilers of statistics. Material for prompt and reliable statistical reports can not be had by this bureau without occasional visits to State and city education offices and the first-hand study of their returns. For the progress of education in the United States and for such an understanding of State and local systems of education as will promote the desired degree of uniformity, it is very important that this bureau shall, in cooperation with State and city school officers, devise and execute plans for greater uniformity in reporting and assisting the several States in making their reports more comprehensive and complete. This is not possible with the small force the bureau now has for this work.

15. A comparatively large increase in the number of clerks, stenographers, copyists, laborers, and messengers to do the work of the bureau as it is now organized, and a still larger increase to do such additional work of this nature as may be made necessary by any enlargement that may be made in the staff of specialists.

16. An appropriation of $10,000 to equip the bureau with modern labor-saving devices. For the want of such devices the clerical work of the bureau is greatly retarded.

17. An increase of appropriation for traveling expenses for the commissioner and employees acting under his direction. This is necessary to enable them to make original investigations in education in different parts of the country and to disseminate information by meeting with educational associations and other societies interested in education. Without funds sufficient to pay necessary traveling expenses, the bureau can not do its work effectively, and must constantly be open to the charge of giving help where expenses can be paid rather than where help is most needed.

18. Means to enable the bureau to cooperate with schools of education in colleges and universities, with normal schools, and with city and county school systems in making important investigations and definite experiments in elementary and secondary school education under scientific control. There is as much need for scientific experiments in education as there is for such experiments in agriculture or engineering. Although we are spending annually many hundreds of millions of dollars on public education, we have little accurate and definite knowledge about the value of various forms of education and methods of teaching, and we can have little more until provision is made for such scientific experiments as are here indicated. With a comparatively small amount of money the bureau might obtain the cooperation of individuals, institutions and boards of education in making important investigations and experiments in education not otherwise possible without much larger expenditures.

19. Means to enable the Bureau of Education to cooperate with State and county school officers in establishing and maintaining model rural schools for the purpose of demonstrating the value of

such forms of rural school organization, management, courses of study, and methods of teaching as may appear to be most desirable to be incorporated in the rural schools of the several States and communities of the United States.

20. A larger appropriation to enable the Secretary of the Interior, in his discretion and under his direction, and with the advice and cooperation of the Public Health Service, to provide for the medical and sanitary relief of the Eskimos, Aleuts, Indians, and other natives of Alaska. Careful investigations made with the cooperation of the Public Health Service have shown the necessity of immediate provision for the care of the health of the natives of this Territory and for the eradication of communicable diseases now prevalent in different sections of the Territory which, if not put under immediate control, will soon destroy the lives of many of these people and spread among the white settlers. The addition of $12,500 to the appropriation for this purpose for the fiscal year, making a total of $75,000 for this purpose, has enabled the bureau to do more for the health of these people than ever before, but much still remains to be done. To do what is needed will require an annual appropriation of at least $125,000. There is need also of an increase in the appropriation for education in Alaska to enable the bureau to establish schools in several villages in which none as yet have been established.

21. The time has come when the natives in all parts of Alaska should be assisted and directed in the establishment and development of industries of their own, which will give them remunerative employment through much of the time in which they are now more or less idle and by which they may make for themselves a better support and gradually take over the larger part of the cost of their own schools and medical attendance. The success of the reindeer industry in the northwestern part of the Territory, and of experiments in other industries, on a smaller scale, in other parts of the Territory would seem to justify the use of a few thousand dollars a year for this purpose for the next 10 or 15 years. The sooner these people are made wholly self-supporting, the less will be the final cost of their support and education to the Government. A few thousand dollars judiciously expended for this purpose now will save hundreds of thousands of dollars later.

22. For the printing of the annual report of the commissioner and the bulletins and circulars which should issue from the bureau each year there should be available not less than $100,000. The growing importance of education in our national life, the large expenditures for schools and other agencies of education, the increasing extension and differentiation of education to meet the new and increasing needs of industrial and civic life have created a demand for such information as is contained in these publications in many and widely varied fields of education. From no other source can this demand be supplied than from this bureau, and from this bureau it should be met as fully as possible. This will require the printing of a large number of bulletins each year, and many of these should be printed in much larger editions. The limit of 12,500 copies for any edition of a bulletin should be removed, so that it may be printed in such numbers as in the judgment of the Secretary of the Interior may be necessary. Fifty or a hundred thousand school officers can not be supplied from an edition of 12,500 copies of a bulletin on a subject in which they are all equally interested.

23. The war emergency has emphasized the importance of some official agency to assist boards of education in finding teachers for colleges, normal schools, and technical schools, and to assist State, county, and city school officers in finding superintendents, supervisors, and teachers of such kinds and grades as are usually sought and obtained from the country at large rather than from local communities. The Bureau of Education is clearly the best agency for such service and the establishment of a School Board Service for this purpose is recommended. Probably $25,000 a year will be sufficient to maintain it. In performing this service the bureau would, of course, cooperate with the appointment agencies of State and city departments of education, and of colleges, universities, and normal schools.

24. The value of and need for community organization, especially in rural communities, become constantly more apparent and interest in the subject has extended to all parts of the country. The experience of two years has shown that such organization can be promoted most effectively by the Bureau of Education in cooperation with State departments of education. A community organization in every school district in the United States and their Territories and possessions would be incalculably valuable for the period of the war and in the period of reconstruction which will follow. It is therefore recommended that the personnel and equipment of the bureau for this work be largely increased.

25. The value of stereopticon and stereoscopic slides, moving-picture films, and phonographic records in school instruction and for extension education through community organizations, women's clubs, and other societies is well established and there is need and an increasing demand for a central agency for the production and circulation of such slides, films, and records. The Bureau of Education, in cooperation with State and city departments of education and institutions of higher learning, might render an invaluable service in this field at small cost. It is recommended that the Commissioner of Education be authorized to produce and otherwise acquire slides, films, and records of educational value and to circulate them, charging for their use at a rate sufficient to pay the cost of production and handling, and that he be authorized to deposit moneys received for their use as a separate account in the Treasury, to be used as a recurrent fund for this purpose. There will be need for a small appropriation to begin the service.

26. The work of instructing persons of foreign birth in the English language and in the geography, history, ideals, industrial requirements, and manners and customs of our country—the work generally known as Americanization—is so very important that it should be promoted both by National and State aid. There are in the United States between thirteen and fifteen millions of persons of foreign birth. Of these approximately 5,000,000 can not read, write, or speak the English language and approximately 2,500,000 of them can not read or write in any language. Such a large proportion of our population unassimilated constitutes a constant menace. With a sufficient appropriation to assist in paying the salaries of teachers and State and local supervisors, and funds for a staff of experts under its immediate direction the Bureau of Education could promote effectively this work of Americanization, so vitally important to the

strength and welfare of the Nation. The bill which has been drafted and recommended by the committee appointed by the conference on Americanization held by the Secretary of the Interior last April, and a legislative committee of the Committee of One Hundred appointed by the Commissioner of Education to advise and assist him in the work of Americanization, makes provision both for the funds and the machinery necessary. It is hoped that this or some similar bill may be considered favorably by Congress at an early date.

27. For the work which the bureau now does more room is needed, and still more will be needed as its staff of experts and clerks is increased. There is now need for more and better arranged space for the bureau's library, which is increasing from year to year. The Nation needs an educational museum, a kind of perpetual educational exhibit, in which there may be found at any time, properly arranged and catalogued, typical courses of study, samples of school furniture and equipment of all kinds, specimens of school work, plans and photographs of buildings and grounds, and whatever else may be helpful in enabling students of education and school officers and teachers to gain an accurate and comprehensive knowledge of purposes, methods, and results of education in this and other countries, and assist them in forming ideas for the improvement of their own schools and school work. This museum should, of course, be under the direction of the Bureau of Education and should constitute an essential part of its equipment. The work of the Federal Board for Vocational Education, of which the Commissioner of Education is a member, is so closely related to that of this bureau that it would add to the efficiency both of the board and of the bureau if they were housed in the same building, so that they might have easy access to the same library and communicate easily with each other; and there are other important activities of the Government which could be carried on more effectively under the same conditions. I, therefore, renew the recommendations contained in previous statements that plans be considered at once for the erection of a building that will afford ample room for the work of the bureau and allied activities of the Government, house the bureau's library, and furnish ample room for such collections of materials as those mentioned above.

Respectfully submitted.

P. P. CLAXTON,
Commissioner.

The SECRETARY OF THE INTERIOR.

REPORT OF THE DIRECTOR OF THE UNITED STATES GEOLOGICAL SURVEY

THIRTY-NINTH ANNUAL REPORT OF THE DIRECTOR OF THE UNITED STATES GEOLOGICAL SURVEY.

GEORGE OTIS SMITH, *Director*.

The appropriations for the work of the United States Geological Survey for the fiscal year 1917–18 comprised items amounting to $1,750,520. The plan of operations as approved by the Secretary of the Interior contemplated surveys and investigations in the United States and Alaska designed mainly to obtain information or to encourage activities essential to the rapid and successful prosecution of the war. The results of the work are reported in detail in the following pages.

SPECIAL WAR ACTIVITIES.

Type of contributions.—Every activity of the Geological Survey that could possibly contribute to the prosecution of the war has been so directed. The personnel, the records, and the methods which represent the products of many years of scientific activity are all being utilized, past experience being thus translated into present service. The special training given to the Survey engineers has made them available for effective service both overseas and in this country; the large amount of technical data collected through the years has been found to possess a present value not anticipated; and the official machinery organized for scientific investigation of the subjects within the Survey's province has also been utilized in the more intensive inquiries required, as each industrial or military need has arisen. The increase in the Survey's representation in the Army from 61 men who had held appointments of the Secretary at the beginning of the year to 322 at the end necessarily involved a serious reduction in the man power available for other contributions to war work. Yet it is believed that both in variety of scope and in volume of results the war activities under direction of the United States Geological Survey were more important during the closing months of this year than ever before.

These special investigations of the year may be broadly classified as related either to war materials or to military surveys. To the study of raw materials both the geologic branch and the water-resources branch have contributed; in the field collection of military data the topographic branch has taken the largest part, but the field men of the other two branches have cooperated.

Raw materials.—The speeding up of American industry has created new demands for mineral raw materials, and some of the demands were intensified by enforced dependence on domestic resources. The materials which have thus assumed greater importance in the industrial world have been called "war minerals," and the field search for new occurrences of war minerals, the prompt examination of newly reported deposits, and the field estimates of the reserves thus made available have constituted a large part of the duties of the geologists of the Survey. In the effort to meet the urgent demand for essential minerals the Survey geologists have visited not only the mining districts of the United States but also deposits of potash and nitrate and chrome and manganese in Central and South America and the West Indies.

The geologic work connected with the mineral fuels has been concentrated on the search for oil pools to stimulate increased production. Close cooperation with the Fuel Administration has made all the geologic data obtained quickly available for use in directing new drilling.

The result of the statistical survey of the United States mineral industry, with its inventory of resources, has still further departed from the customary annual statement provided for by the specific appropriation. To meet the regular needs of the War Industries, Shipping, and War Trade boards and the Fuel and Railroad administrations, as well as special inquiries of the General Staff of the Army, the Ordnance bureaus of the Army and Navy, and the Tariff Commission increased attention has been given to quarterly, monthly, and weekly reports of mineral production. Even daily reports on coal shipments are compiled, and in the support of the Survey's coal statistical work the Fuel Administration has largely cooperated.

As a further contribution to the problem of meeting the Nation's fuel requirements, the hydraulic engineers of the Survey are engaged in a country-wide survey of the power situation to determine where water power can be substituted for steam-generated power or where coal can be saved by interconnecting electric plants or systems.

The increasing demand for the facts regarding the mineral raw materials led the Geological Survey to take the initiative in organizing a joint information board as a clearing house for interbureau inquiries regarding mineral products, thus making the Survey's store of information, as well as that of the other bureaus and boards, more quickly and fully available for all the Government organizations, new and old. All the interested official bodies have membership in this cooperative board, in which a representative of the War Industries

Board, Mr. Pope Yeatman, is chairman, and a Survey geologist, Mr. E. S. Bastin, is executive secretary.

Connected with both the field examinations and the statistical work is the preparation of special reports for the Capital Issues Committee. These reports cover both mineral properties and power and water systems seeking authority for new development or enlargement, and most of them have embodied data collected in former years in the course of the regular investigations made by the Survey's geologic and hydrologic engineers.

Still another natural extension of these investigations of natural resources has been the study of the mineral and power resources of the world, in response to the growing recognition of the fact that it is not sufficient to know simply what America possesses.

Military surveys.—Since March 26, 1917, the regular topographic work by the Survey engineers has been confined to the general military surveys along the United States borders in accordance with the program set forth by the General Staff. More and more, however, it has become necessary that the engineer reserve officers not recalled from the Geological Survey for overseas service should make special surveys of sites for munition plants, testing grounds, artillery ranges, airplane and balloon fields, cantonments, and other military reservations. In connection with these special surveys and the regular topographic work the Geological Survey has served as a training school for other engineer reserve officers detailed for instruction in field methods preparatory to service overseas.

In addition to the topographic surveys of a military character there has been an increased amount of confidential military data collected in the field by the Survey geologists and hydraulic engineers. Much of this has been contributed in connection with the progressive military work, but more detailed data have been collected to answer specific inquiries as to water supply, structural materials, and oil and gas available at sites for camps, aviation fields, and munition plants. The special examinations of surface and underground water supplies have increased in number and included both qualitative and quantitative studies, as well as investigations of problems of sewage disposal.

Military maps.—The contribution of the Survey's map engraving and printing plant has not been limited to the reproduction of the surveys executed by the topographic engineers but has included the reprinting of hydrographic and British Admiralty charts in large numbers for the Navy Department and various military maps of French and Belgian areas for the War Department. Motor-truck route maps and airplane route maps have also been compiled and printed for the use of the Army, as well as special charts and maps for use at instruction camps. An interesting use of this specially equipped printing plant has been the regular issue of camouflage charts for the Navy. The regular geologic-map work has given place during the period of the war to these exigency calls for color printing for military purposes.

Results.—The distribution among the various branches of the military departments and the war boards of the service represented by these activities is shown in the accompanying diagram (Pl. I), as well as on the more detailed charts illustrating the reports of the geologic, topographic, and water-resources branches (Pls. II–IV). Yet these charts are simply diagrammatic and express only in part the results of the year's activities. Every member of the organization, clerical no less than technical, has met the call for larger service. The service of the engineer officers in France and the other Survey representatives in uniform has been largely the extension simply of the same type of technical work in the United States, and this fact has given point to all the official work. The realization that immediate use was being made of all the data collected by the Survey investigators has strengthened the desire for practical accuracy, and the war work of the scientists has undoubtedly stimulated the tendency toward seeking quantitative rather than merely qualitative results. The war has given science a larger opportunity to be useful.

War honors.—The following general order furnishes evidence of the value of the special service rendered overseas by the topographic engineers contributed by the Geological Survey.

HEADQUARTERS RAILWAY ARTILLERY RESERVE, A. E. F.,
France, May 18, 1918.

Memorandum
No. 1.

The following is published for the information of all concerned:

"EIGHTH ARMY ARTILLERY STAFF, No. 2916,
"*Headquarters, May 11, 1918.*

"Order No. 24.

"Colonel Rebourseau, Acting Artillery Commander, Eighth Army, cites in Army Artillery Orders:

"Lieutenant Kostka Mudd, C. E., U. S. R., Group 8-inch howitzers, American Howitzer Regiment,

"Orienteur officer of a group of 8-inch howitzers, displayed a most praiseworthy devotion to duty. On two separate occasions executed difficult topographic operations under heavy bombardment. Seriously wounded while engaged in this duty.

"Colonel Acting Artillery Commander, Eighth Army.

"(Signed) REBOURSEAU."

(2749)

By command of Brigadier General COE:

J. F. HOWELL,
Colonel, General Staff Corps, Chief of Staff.

Official:

J. H. COCHRAN,
Captain Coast Artillery Corps, Adjutant.

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GROVE KARL GILBERT.

The coming of large opportunity for special service as outlined in the preceding pages gives added force to any tribute to those who have fitted the Survey organization for effective work. Grove Karl Gilbert was one of the original members of the Survey and retained the position of geologist until his death on May 1, 1918. By reason of his earlier connection with two of the earlier Federal surveys, the Wheeler and Powell surveys, and his continuous service of 39 years with the present organization, Mr. Gilbert had perhaps the largest opportunity to influence the working geologists in the Federal service, and that he so fully improved that opportunity was due to his exceptional talent for scientific leadership. His first work under the present Survey, the Lake Bonneville monograph, still retains its place as the premier among the more than 1,300 scientific and technical volumes of the United States Geological Survey. To those who had the privilege of reading Monograph I while they were beginners in geology there came an inspiration for thorough observation of geologic facts and clear analysis of geologic processes that remains linked with the name of G. K. Gilbert, but doubly fortunate were the smaller number of students who sat under the teaching of this scholarly investigator, who saw the truth so clearly. Happily, Mr. Gilbert's influence upon geologists was extended to the scores of members of the Survey's scientific staff who successively were associated with him in official life, and the closer that association the more enthusiastic was the recognition of helpful stimulus received.

The combination of keen mind and kind heart granted to Mr. Gilbert in so generous measure made him a leader in scientific thought, whose share in making and fixing the standards of the United States Geological Survey can not be overestimated. At this time, when the organization to which he devoted the best part of his life is making its largest contribution of usefulness to the Nation, full credit must be given to Mr. Gilbert and the other pioneers in scientific public service. Among his many contributions to geologic science, Mr. Gilbert's last, the professional paper on the mining-débris problem in the Sierra Nevada, was characterized by the same thoroughness of treatment which gave both value and charm to the Bonneville monograph. Throughout the period between Mr. Gilbert's first study of the Great Basin region and the completion of his Sierra Nevada investigation his outlook upon his science was so broad as to bring every type of data to bear upon the problem in hand, and his purpose was everywhere evident to determine quantitatively as many factors as possible. Mr. Gilbert was a geologist who won the respect of the engineer, and his influence was unconsciously exerted in giving to his science that degree of accuracy which can state results in figures as well as in adjectives. Pure science as given to the world by Grove Karl Gilbert was useful science.

WORK OF THE YEAR.

PUBLICATIONS.

The publications of the year numbered 229 and consisted of 1 annual report, 6 professional papers, 11 separates from 3 professional papers, 14 bulletins, 48 separates from 6 bulletins, 17 water-supply papers, 2 separates from 1 water-supply paper, 1 annual report on mineral resources in two parts, 61 separates from 2 annual reports on mineral resources, 1 new geologic folio and 1 folio in the octavo edition, 1 list of publications, 1 circular listing geologic folios available, 1 advance statement on copper in 1917, 2 index-map circulars, 1 book entitled "Manual for the Artillery Orientation Officer," 48 press bulletins, and 12 monthly lists of new publications. The total number of pages in these publications was 14,913. Brief notices of the publications in the regular series are given below:

Thirty-eighth Annual Report of the Director of the United States Geological Survey to the Secretary of the Interior, for the fiscal year ended June 30, 1917. 1917. 176 pages, 2 plates.

A detailed account of the work of the Geological Survey during the fiscal year 1917, including reports from each branch, division, and section, abstracts of the publications of the year, and maps showing areas covered by geologic and topographic surveys. Under the heading "Special features" the Director discusses the war work of the Survey, emphasizing the use made of results already at hand as the product of years of field and office investigation; the concentration of present geologic field work on the essential mineral resources, especially those of which the domestic supply falls short of current demands; and the notable contributions made by the Survey to the conduct of the war through the diversion of practically all the activities of the topographic branch to the urgent needs of the War Department for military surveys, the printing of a large number of maps and charts for the War and Navy Departments in the Survey's plant, and the commissioning in the Engineer Officers' Reserve Corps of a group of 69 specially trained Survey engineers, two of whom were appointed on Gen. Pershing's staff. During the year the Survey moved to the new Interior Department Building the completion of which marked the culmination of the efforts of three directors of the Survey to procure quarters both adequate for its work and safe for the Survey workers and the large accumulation of scientific records. Nearly one-third of the building is occupied by the Survey.

Professional Paper 93. Geology of the Navajo country; a reconnaissance of parts of Arizona, New Mexico, and Utah, by H. E. Gregory. 1917. 161 pages, 34 plates, 3 text figures.

The region described as the Navajo country lies mainly in northeastern Arizona, between Puerco, Little Colorado, Colorado, and San Juan rivers and the one hundred and eighth meridian, and contains over 25,000 square miles. Of this area more than 22,000 square miles is included within six Indian reservations, which form the largest area of undeveloped Indian land in the United States. The Atchison, Topeka & Santa Fe Railway extends along the southern margin of this region, but most of the region is difficult of access, roads and trails are few, water is scanty and generally poor, and food for animals is scarce. The white population is very small and consists of widely scattered Government officials, traders, and missionaries. The Indians number over 32,000 and are none too friendly. Geologic work in such a country is necessarily reconnaissance; some of it, in fact, is exploratory. As the region is arid, the primary object of the investigation was to obtain information concerning the water supply. The results of this phase of the work have been set forth in Water-Supply Paper 380, noticed in the Thirty-eighth Annual Report. So far as the demands of the main problem permitted, geologic mapping was done and the most significant geologic features were noted. This phase of the work is reported in Professional Paper 93. It is believed that in view of the limits imposed by the nature of the work the geologic map accompanying this paper represents fairly well the areal geology of the Navajo country and that the text presents the essential facts in its geologic history. Stratigraphy received the most attention and is discussed in greatest detail; igneous rocks, structure, physiography, and economic geology are treated somewhat less fully. An appendix gives a list of geographic names in the Navajo country, with the authority, significance, and origin, compiled from the best available sources, as well as the author's own observations. The paper is illustrated by numerous views of striking or significant geologic features and both topographic and geologic maps.

PROFESSIONAL PAPER 96. The geology and ore deposits of Ely, Nev., by A. C. Spencer. 1917. 189 pages, 15 plates, 4 text figures.

This paper is not only a monographic study of the most productive copper district in Nevada but the first report to be issued by the United States Geological Survey to describe adequately some of the great deposits of disseminated ore which during the last few years have contributed so largely to the copper output of the country. The chemistry of ore deposition and enrichment is discussed more thoroughly and closely in this report than it commonly is in a geologic monograph, and because of the author's wide field experience and of the many suggestions that he makes for future experimental investigations this part of the report should be of especial value. The general geologic features of the district are clearly set forth, and the ore deposits are described with the completeness of detail that is characteristic of the Survey's reports on mining districts. The descriptions of the mines and prospects are illustrated by numerous maps and sections, and the paper contains also topographic and geologic maps of the district and views of some of its principal features.

PROFESSIONAL PAPER 98. Shorter contributions to general geology, 1916; David White, chief geologist. 1917. 395 pages, 102 plates, 46 text figures.

Contains 22 papers by 20 authors. These papers, which had previously been published separately, have been noticed in the Thirty-seventh and Thirty-eighth annual reports.

PROFESSIONAL PAPER 99. Chemical analyses of igneous rocks published from 1884 to 1913, inclusive, with a critical discussion of the character and use of analyses (a revision and expansion of Professional Paper 14), by H. S. Washington. 1917. 1,201 pages, 3 text figures.

This paper contains 8,602 analyses of igneous rocks, collected by a very extensive, systematic, and thorough search of the literature. Among them are included practically all those given in Professional Paper 14 (published in 1903 and now out of print), which embraced 2,881 analyses. The progress made in this branch of geology is shown not only by the greatly increased number of analyses but by their better quality and greater fullness. In discussing the character of rock analyses the author mentions the tendency, even among petrographers, to accept without question the results of an analysis—to assume that the analyst, like the proverbial king, can do no wrong. This assumption applies, of course, not to the personal good faith of the analyst but to the analytical methods he employs. Comparatively few petrographers seem to recognize the difficulties and uncertainties of analytical work. A consequence of this unquestioning confidence is that such work is likely to be intrusted to a student in chemistry who has had no experience in quantitative rock analysis and does not appreciate its complexities and difficulties. Dr. Washington urges that the ability to make an accurate and complete chemical analysis of an igneous rock should form an essential part of the training and equipment of every petrographer and sets forth criteria by which analyses may be judged. The analyses included in this volume have been rated according to these criteria in five classes, described as excellent, good, fair, poor, and bad. Those of the first three classes, called superior analyses, are considered worthy of use in petrologic discussions; those of the other two classes are of little or no use. Of the 8,602 analyses included in this collection over 6,500 are classified as superior. The norms of the superior analyses of fresh rocks, numbering nearly 5,000, have all been recalculated, and these analyses are arranged according to the quantitative system of classification, an outline of which is given as one of the appendixes. Several indexes facilitate reference to the analyses. To the petrographer this volume should be useful in many ways. It includes practically all the analyses of igneous rocks that have been published during the 30 years ending with 1913, so arranged that they may be readily studied and compared. The references that accompany the analyses constitute an extensive bibliography of the science of petrography.

PROFESSIONAL PAPER 100-B. The coal fields of Ohio, by J. A. Bownocker, with a computation of the original coal content of the fields by F. R. Clark. 1917. Pp. 35-96, Pls. II-IX, figs. 4-49.

Part of Professional Paper 100, The coal fields of the United States. The volume of which this paper forms the second part to be published is planned to give information concerning the quantity, quality, and geographic distribution of the coal still in the ground in this country and available for future use. As Part A was a general introduction to the volume, this paper is the first of the series covering the separate States or groups of States. It was prepared by the State geologist and describes the coal beds in detail, with numerous maps and both tabular and graphic sections, shows the composition of the coals by a large number of analyses, and discusses the uses to which Ohio coals are put. The computations of the original coal content of the several fields indicate a total of 87,638,000,000 tons, of which 86,552,000,000 tons remains available.

PROFESSIONAL PAPER 101. Geology and paleontology of the Raton Mesa and other regions in Colorado and New Mexico; papers by W. T. Lee and F. H. Knowlton. 1917. 450 pages, 103 plates, 16 text figures.

The primary object of the studies whose results are set forth in these papers was to determine the geologic relations in the Raton Mesa region, a highly dissected plateau lying just east of the Rocky Mountains and extending across the boundary between Colorado and New Mexico. This region is a geologic unit but comprises two coal fields, one in each State. The coal occurs in two formations, separated by an unconformity, and the questions whose answers were sought in these studies are whether or not the coal-bearing formations are widely separated in time and with what formations they are to be correlated. Mr. Lee concludes that the lower formation is Upper Cretaceous and the upper formation is Eocene and that the unconformity represents post-Cretaceous erosion. As his conclusions differ radically from those held by some other geologists, he states briefly the fundamental principles that have governed him in placing the Cretaceous-Tertiary boundary. The principle is generally accepted that the uplift in western America which drained the continent and culminated in the formation of the mountains marks the division of time between Cretaceous and Tertiary, but there is no general agreement in applying this principle. Mr. Lee believes that the first of a series of movements that followed a long period of quiescence and ushered in a succession of crustal disturbances like those of the Tertiary is more significant in delimiting periods of geologic time than the greatest movement of the series, and therefore that the lowest well-marked unconformity above rocks of undoubted Cretaceous age in the Rocky Mountain region—the unconformity here described—should constitute the line of separation between Cretaceous and Tertiary. The paper discusses the general geology, describes the local features in detail, with sections, maps, and views, and sets forth the correlation of the formations with those of other regions. The coal-bearing formations contain great numbers of fossil plants, of which some afford a means of correlation with the formations of other fields and others are new to science. These plants are described and illustrated by Mr. Knowlton.

PROFESSIONAL PAPER 105. Hydraulic-mining débris in the Sierra Nevada, by G. K. Gilbert. 1917. 154 pages, 34 plates, 33 text figures.

The protest and litigation resulting from the conflict of interest between the hydraulic miners of the Sierra Nevada and the valley farmers whose alluvial lands were being buried and ruined by mine tailings washed down by floods from the mountains culminated in 1884 in a series of injunctions whereby the miners were restrained from casting their tailings into the streams. In 1893 a permanent board, known as the California Débris Commission, was appointed with authority to regulate hydraulic mining in such a way as to prevent any injury to the navigable waters of Sacramento and San Joaquin rivers. Under licenses granted by this commission a small amount of hydraulic mining was carried on, but the experience of the first 10 years seemed to demonstrate that the great deposits of auriferous gravel, whose average gold content is small, could not be exploited at a profit under such restrictions. In 1904 the California Miners' Association addressed a memorial to the President requesting him to instruct the United States Geological Survey to make a study of those portions of the Sacramento and San Joaquin valleys affected by the detritus from torrential streams. This study was undertaken, and the present report deals largely with the geologic and physiographic aspects of the subject. The phase of the study covered by a laboratory investigation of the laws of transportation of detritus by running water had already been treated in Professional Paper 86, by the same author. Professional Paper 105 gives a historical outline of the development and restriction of hydraulic mining in California, a discussion of the physical features of the northern part of the great interior valley of the State, a summary of the evidence indicating subsidence of the land, an account of the changes in the condition of rivers and bays from artificial causes, including some changes not attributable to mining, data on the quantity and distribution of detritus, a report of studies on Yuba River, where retaining works had been erected, an analysis of the relation of the movement of débris to the Golden Gate bar, and suggestions for future handling of this problem. The author's studies show that the depth of water on the bar outside the Golden Gate, a matter of prime importance to the port of San Francisco, depends chiefly on the supply of sand brought to the bar and the velocity of the tidal currents by which it is distributed. The sand brought to the head of Suisun Bay by Sacramento and San Joaquin rivers is not believed to reach the bar in any appreciable quantity, but the tidal scour through the Golden Gate is reduced by deposits on shoals in the bays and by encroachments on the area of the bays through the reclamation of bordering marsh lands and other causes. Every acre of reclaimed tide marsh implies a fractional reduction of the tidal current in the Golden Gate. The question whether the community should make a large addition to its permanent agricultural wealth at the cost of a small permanent injury to its great harbor is a question of relative values. The stress which caused the restriction of hydraulic mining no longer exists. By means of suitable works for the control of floods in the valley rivers mining might be partly resumed without prejudice to any valley interest except navigation. The important interest which now dictates that débris should be controlled is that of the commerce which traverses the Golden Gate. Possibilities for resumption of mining on a large scale, with storage of débris, lie in cooperation with irrigation and electric-power development for the control of Sierra streams. This paper is abundantly illustrated with views of features showing different phases of the subject, diagrams, and maps.

Parts of Professional Paper 108, Shorter contributions to general geology. 1917, as follows:

Professional Paper 108–F. A fossil flora from the Frontier formation of southwestern Wyoming, by F. H. Knowlton. 1917. Pp. 73–107, Pls. XXVII–XXXIX.

This paper deals with a small but important fossil flora from the vicinity of Cumberland, Lincoln County, Wyo. The plants were discovered by Frémont in 1843, were described and figured by Hall in 1845, and then remained in obscurity and practically lost for more than 40 years. A part of the collection was found in 1887 in the National Museum, covered with dust and without adequate labels. Attempts to determine the locality from which they came by means of Frémont's account were unsatisfactory, but finally the discovery of identical material near Cumberland removed the doubt. They were referred tentatively by Hall to the Jurassic but are now known to be of Colorado age (Cretaceous).

Professional Paper 108–G. Orbitoid Foraminifera of the genus *Orthophragmina* from Georgia and Florida; papers by C. W. Cooke and J. A. Cushman. 1917. Pp. 109–124. Pls. XL–XLIV, figs. 19–20.

Mr. Cooke discusses the stratigraphic and faunal associates of the species described by Mr. Cushman, in order to make evident the value of these species in the investigation of problems of geologic correlation.

Professional Paper 108–H. The Pliocene history of northern and central Mississippi, by E. W. Shaw. 1918. Pp. 125–163, Pls. XLV–LX, figs. 21–25.

The record of Pliocene time in northern and central Mississippi is generally assumed to be scant or lacking, but recent work on the later Tertiary and Quaternary geology of the Mississippi embayment has brought to light a large mass of data bearing on the Pliocene history of this region, and the object of this paper is to present some of these data and point out their apparent significance. The author concludes that at the beginning of the Pliocene epoch the surface of Mississippi was smoother than it is to-day, that this surface of low relief persisted through perhaps a third or a half of the epoch, and that it was then uplifted intermittently, during four principal stages, to a maximum amount of 200 feet. This part of the State was at the beginning of Pliocene time at least 100 feet above the highest hills remaining to-day, and much of it was lowered by erosion more than 200 feet in the Pliocene epoch. The paper is profusely illustrated with views of surficial features, maps, and sections.

Professional Paper 108–I. Stratigraphy in southwestern Maine and southeastern New Hampshire, by F. J. Katz. 1917. Pp. 165–177, Pl. LXI, fig. 26.

Describes the geologic formations in an area of about 1,500 square miles lying mostly between Portland, Me., and Portsmouth, N. H., a part of the New England coastal lowland whose rock surface is abundantly mantled with glacial drift and over broad areas deeply buried under outwash deposits of late Pleistocene age.

Professional Paper 108–J. The Flaxville gravel and its relation to other terrace gravels of the northern Great Plains, by A. J. Collier and W. T. Thom, jr. 1918. Pp. 179–184, Pls. LXII–LXV, fig. 27.

Describes a terrace deposit of Miocene or early Pliocene age, occurring at intervals south of the international boundary for 175 miles westward from the vicinity of Flaxville, Mont., and shows its relation to Canadian deposits of Oligocene age a short distance north of the boundary. This deposit is composed largely of pebbles from the Rocky Mountains, to the west, and contains numerous fossil bones, which have been found at 25 widely separated localities.

PROFESSIONAL PAPER 108-K. The Helderberg limestone of central Pennsylvania, by J. B. Reeside, jr. 1917. Pp. 185-225, figs. 28-30.

Presents the results of a study of certain formations which have been examined in Maryland, New Jersey, and New York and described with more or less detail but concerning whose occurrence in the intervening area in Pennsylvania little exact information has been available. Gives a number of local sections in great detail.

PROFESSIONAL PAPER 108-L. Stratigraphy of the Hanna Basin, Wyo., by C. F. Bowen. 1918. Pp. 227-235, Pl. LXVI, fig. 31.

Describes an area in Carbon County, Wyo., that has attracted the attention of geologists since the days of the territorial surveys under King, Hayden, and Powell. Gives evidence to show that what had previously been regarded as a single formation consists of two formations separated by a marked unconformity and offers some suggestions as to the source of the material in the more than 20,000 feet of continental deposits in this area.

This pamphlet contains a title-page, table of contents, and index for the use of those who may wish to bind the separate parts of Professional Paper 108.

Parts of Professional Paper 120, Shorter contributions to general geology, 1918, as follows:

PROFESSIONAL PAPER 120-A. New determinations of carbon dioxide in water of the Gulf of Mexico, by R. C. Wells. 1918. Pp. 1-16, fig. 1.

Although the carbon dioxide in sea water is the subject of an extensive literature, recent advances in geochemistry have brought out new relations that require further determinations in order to show the connection, if any exists, between the history, temperature, and geographic location of the water, the life it contains, and its saturation with calcium and magnesium compounds. This paper gives the results of determinations on water from the Gulf of Mexico, which is essentially similar to that of the open ocean.

PROFESSIONAL PAPER 120-C. Deposits of Claiborne and Jackson age in Georgia, by C. W. Cooke and H. K. Shearer. 1918. Pp. 41-81, Pl. VII, figs. 7-9.

Information obtained in field work during the last few years in the Coastal Plain of Georgia throws light on certain previously unsolved problems of stratigraphy and considerably alters some former correlations. This paper presents the new evidence regarding the age and correlation of the Eocene formations of Georgia and gives revised descriptions of the deposits of Claiborne and Jackson age.

PROFESSIONAL PAPER 120-E. Two lamprophyre dikes near Santaquin and Mount Nebo, Utah, by G. F. Loughlin. 1918. Pp. 101-109, fig. 13.

No description of lamprophyre dikes in Utah has heretofore been published, and this paper is presented as a contribution to the petrology of the State. The two dikes described are on the west slope of the Wasatch Mountains.

BULLETIN 597. Geology of Massachusetts and Rhode Island, by B. K. Emerson. 1917. 289 pages, 10 plates, 2 text figures.

In preparing this treatise and the accompanying geologic map the author endeavored to use all the material available. A large part of the area is described from the results of his own studies, which began in 1871. The State of Massachusetts presents a perfect illustrative section across the Appalachian Mountain system in an area where it culminates in variety and complexity, about midway in its great sweep from Newfoundland to Alabama. This area lies just south of the region where the great folds of this mountain system were compressed against the Adirondacks, by forces thrusting from the east, in a zone where the ancient unfolded rocks of New York form the foreland. The broad topographic divisions of the State, which have been marked out by erosion, are also the broad geologic divisions. These are the limestone valley of the Housatonic; the upland of eastern Berkshire County, largely granite; the sandstone valley of the Connecticut; the central upland, or Worcester County plateau, made up of granite and schist; the slope descending eastward from the central upland, underlain by a great complex of stratified and igneous rocks; and the Coastal Plain, including Cape Cod Peninsula and the islands to the south. The illustrations of this report include views of rock specimens and of models showing restorations of the great Triassic reptiles whose footprints have been found in the Connecticut Valley and a detailed geologic map of the two States.

Bulletin 641. Contributions to economic geology (short papers and preliminary reports), 1916, Part II, Mineral fuels; David White, G. H. Ashley, and M. R. Campbell, geologists in charge. 1917. 333 pages, 25 plates, 36 text figures.

Contains 12 papers of the classes indicated in the subtitle, by 11 authors. These papers were published separately in advance and have been noticed in the Thirty-seventh and Thirty-eighth annual reports.

Bulletin 647. The Bull Mountain coal field, Musselshell and Yellowstone counties, Mont., by L. H. Woolsey, R. W. Richards, and C. T. Lupton; compiled and edited by E. R. Lloyd. 1917. 218 pages, 36 plates, 2 text figures.

The Bull Mountain coal field, which lies somewhat southeast of the center of Montana, about 25 miles north of Billings, came into prominence in 1906-7, soon after the construction of the Pacific coast extension of the Chicago, Milwaukee & St. Paul Railway, which passes through the northern part of the field. The coal is a subbituminous coal of high grade, the beds are in general situated favorably for mining and can be reached by short spurs from the railway, and sufficient water and timber are to be had near by. All the conditions in the field give promise that the growth of the coal-mining industry here will be steady and persistent. The Survey has already published preliminary reports on the salient geologic and economic features of the field, and the present report describes the field and the coal beds in greater detail and gives some additional information. The description is arranged by townships, and each township description is accompanied by a map showing the topography and economic geology, including sections of the coal beds. A general geologic map of the whole field is also given, and the report contains several views showing geologic features of interest.

Bulletin 651. Spirit leveling in Ohio, 1898 to 1916, inclusive; R. B. Marshall, chief geographer. 1917. 456 pages, 2 plates.

Gives the results of all spirit leveling done by the Geological Survey in Ohio to the end of 1916. Primary or precise leveling has now been extended over the entire State, and every county has several bench marks well distributed within its area. These bench marks are shown on a map of Ohio included in the bulletin. The highest point in the State is said to be Campbell Hill, in Logan County, 1,550 feet above sea level.

Bulletin 654. Spirit leveling in Nevada, 1897 to 1916, inclusive; R. B. Marshall, chief geographer. 1917. 91 pages, 1 plate.

Gives the results of all spirit leveling done by the Geological Survey in Nevada to the end of 1916. The elevations recorded range from 470 feet on Colorado River in Clark County to 13,145 feet on East Peak, in the White Mountains, in Esmeralda County.

Bulletin 655. The Lake Clark-central Kuskokwim region, Alaska, by P. S. Smith. 1917. 162 pages, 12 plates, 6 text figures.

The lower part of the Kuskokwim Valley was explored by the Russians in the first half of the eighteenth century, and the upper part was explored by the United States Geological Survey in 1898. In 1909 the Iliamna region, southeast of the Kuskokwim, was covered by an extensive geologic and topographic reconnaissance survey. The exploration of the region between Lake Clark and Kuskokwim River, whose results are set forth in this report, was planned to tie together these earlier surveys. It traversed a field that was almost unknown except through the reports of a few prospectors and fur hunters, and therefore its results replace a nearly complete blank in our knowledge of the geography and geology of Alaska. During this exploration 4,800 square miles of previously unsurveyed country was mapped, the positions of certain previously known features were determined with greater precision, data were obtained concerning the geologic and physiographic character and history of this region, and some notes were made about the flora, fauna, climate, and population. Few mines or prospects are being developed in this region, but the report gives a sketch of the mineral resources and a summary of the general conditions that prevail at the mining camps in adjacent regions. The principal metalliferous deposits are those of gold and quicksilver, but other minerals occur in minor amounts. The report is well illustrated with views of the region and contains topographic and geologic maps.

Bulletin 656. Anticlines in the southern part of the Big Horn Basin, Wyo.; a preliminary report on the occurrence of oil, by D. F. Hewett and C. T. Lupton. 1917. 192 pages, 32 plates, 12 text figures.

Gives information regarding 50 domes and anticlines, gathered during geologic examinations made for the purpose of classifying the lands in the Big Horn Basin according to their content of oil or other minerals. At the time of publication 11 of these anticlines had already proved to be productive of oil, though some of them had not been drilled sufficiently to indicate their commercial value. The surface indications suggest that at least half of the anticlines described in this paper constitute some of the most promising undeveloped oil territory in Wyoming. The Big Horn Basin seems to be destined to furnish a large contribution to the Nation's supply of high-grade oil. The paper contains numerous structure-contour maps, and each anticline is described in detail.

Bulletin 658. Geologic structure in the Cushing oil and gas field, Okla., and its relation to the oil, gas, and water, by C. H. Beal. 1917. 64 pages, 11 plates, 4 text figures.

Sets forth some interesting facts that are thought to be related to the accumulation of oil and natural gas, disclosed on analysis of a large amount of information collected by a petroleum technologist of the Bureau of Mines in connection with the supervision of "oil and gas mining operations on allotted lands leased by members of the Five Civilized Tribes" authorized by the act of August 1, 1914. The Cushing field is the most productive light-oil field in the world and embraces nearly 35 square miles of productive territory, in which have been drilled about 2,500 wells ranging in depth from about 1,200 to nearly 3,000 feet. Until other fields have been similarly studied and more facts become available only tentative hypotheses can be advanced to account for the phenomena observed. It is hoped that this paper will stimulate such studies, so that ultimately a large body of facts may be obtained to throw light on the laws governing the accumulation of oil and gas. The paper contains several structure maps.

Bulletin 659. Cannel coal in the United States, by G. H. Ashley. 1918. 127 pages, 8 plates, 27 text figures.

Cannel coal is essentially a rock formed by the solidification and partial oxidation of water-laid deposits consisting mainly of plant spores, pollen grains, and remains of low orders of water plants and animals. It differs from bituminous coal, which is derived from woody or peaty material grown in place. About 60 years ago cannel coal was the principal source of oil in the United States, but the discovery of rock oil naturally knocked the bottom out of the "coal-oil" industry. The recent rapid growth in the demand for hydrocarbons and their products has brought about a renewed interest in cannel coal, which is one of the richest substances in hydrocarbons known. The availability of these hydrocarbons for the chemical industry is yet to be proved but the increasing number of inquiries for information concerning cannel coal have led to the preparation of this report. The author has compiled a large number of facts about cannel coal from many sources and gives the results of his own observations on some of the deposits. Many analyses, including some of English and Scotch cannels, are given, and the properties, composition, origin, mode of occurrence, and uses of cannel coal are discussed. The known deposits in this country are described in detail. The book contains numerous maps and sections, together with views showing the character of the coal.

Parts of Bulletin 660, Contributions to economic geology, 1917, Part I, as follows:

BULLETIN 660-B. Notes on the greensand deposits of the eastern United States, by G. H. Ashley; Methods of analysis of greensand, by W. B. Hicks and R. K. Bailey. 1917. Pp. 27-58, Pl. II, fig. 1.

The shortage of potash resulting from the shutting off of the foreign supply has led to a vigorous search for possible new sources in this country. Among the mineral deposits that contain potash are the greensands of the Eastern States, which underlie hundreds if not thousands of square miles within reach of the steam shovel. The object of Mr. Ashley's paper is to place before chemical engineers and others succinct information as to the location and extent of easily accessible deposits in the Eastern States and as to their content of potash. The deposits discussed lie in New Jersey, Delaware, Maryland, Virginia, North Carolina, Tennessee, and Arkansas, and those in New Jersey and Delaware were found to be the best and most available, their potash content ranging from 3.50 to 7.15 per cent. These deposits are abundant, and the practical question is one of profitable exploitation.

The second paper discusses discrepancies shown in analyses of greensand made by different methods and describes the method used by the Geological Survey, which is much shorter than any other known method and is believed to be sufficiently accurate for commercial work.

BULLETIN 660-C. Manganese deposits of the Caddo Gap and De Queen quadrangles, Ark., by H. D. Miser. 1917. Pp. 59-122, Pl. III, figs. 2-13.

The high prices offered for manganese ores on account of the war demand have stimulated interest in the manganese deposits of west-central Arkansas, which had previously been little exploited. Recent developments, which began in 1916, have been confined almost entirely to the area discussed in this paper. The author gives an outline of the geology of the area and describes the ore deposits and the mines and prospects in detail. He concludes that some of these deposits that might now be worked at a profit will not pay to work after the price of ore again becomes normal. The paper contains a geologic map and numerous sections and diagrams showing the mode of occurrence of the ore.

BULLETIN 660-D. Tin resources of the Kings Mountain district, North Carolina and South Carolina, by Arthur Keith and D. B. Sterrett. 1917. Pp. 123-146, Pl. IV.

Describes a tin belt that lies along or near the Southern Railway between Bessemer City, N. C., and Gaffney, S. C. No known tin deposit in this belt is more than 3 miles from a railroad. Considerable work has been done on the tin-bearing veins in this area but not enough to indicate conclusively whether they are of commercial value. The paper discusses the general geology of the area and describes the mines and prospects.

BULLETIN 660-E. Louisiana clays, including results of tests made in the laboratory of the Bureau of Standards at Pittsburgh, by G. C. Matson. 1917. Pp. 147-158, Pl. V, figs. 14-15.

Describes samples of clay obtained from the principal geologic formations of Louisiana at a number of localities. The samples were collected to determine the possibilities of obtaining clays suitable for the manufacture of brick, terra cotta, tile, and other building materials, for which the demand is gradually increasing. The paper contains a map showing the distribution of clay-bearing formations in Louisiana, diagrams of well sections, and a table giving the results of the tests.

BULLETIN 660-F. Ore deposits of the northwestern part of the Garnet Range, Mont., by J. T. Pardee. 1918. Pp. 159-239, Pls. VI-IX, figs. 16-25.

The area described in this paper lies in western Montana, about 30 miles southeast of Missoula. It has yielded between $6,000,000 and $10,000,000 in placer gold and about $1,500,000 in gold, besides considerable copper, lead, and silver, from lodes. Most of the mines show no evidence of being exhausted, and new discoveries are looked for throughout the area. The paper consists of an outline of the geography, physiography, and geology and a detailed description of the ore deposits and the mines and prospects. It is illustrated by geologic maps and sections showing veins and workings.

BULLETIN 660-G. The Dunkleberg mining district, Granite County, Mont., by J. T. Pardee. 1917. Pp. 241-247, Pl. X, fig. 16.

Describes a small district in western Montana about 50 miles northwest of Butte. Lode mining has been carried on intermittently in this district during the last 30 years, and the total production is estimated at $200,000 in silver and lead.

BULLETIN 660-H. The antimonial silver-lead veins of the Arabia district, Nev., by Adolph Knopf. 1918. Pp. 249-255.

The Arabia district, in Humboldt County, Nev., was an active mining camp in the late sixties but has been idle till recently. The present high prices of lead, antimony, and silver have stimulated renewed activity in this district, and this paper is a sketch of the ore deposits and the mines and prospects. The author concludes that it is not unreasonable to expect that rich secondary antimonial silver sulphides will be found at depths greater than those reached by the present workings and that the district merits deeper exploration than has yet been attempted.

BULLETIN 660-I. Strontianite deposits near Barstow, Cal., by Adolph Knopf. 1918. Pp. 257-270, Pl. XI.

Strontium is used principally in the form of strontium hydrate in a process for the recovery of sugar from the large amounts of molasses that are unavoidably produced during the manufacture of beet sugar. This process is used in several foreign countries. Strontium is also used in signal lights and in fireworks to give a brilliant red color to the flame. Of the two commercial sources of strontium the carbonate, strontianite, is the more valuable, though much less common than the sulphate, celestite. War conditions have stimulated the search for new deposits, and strontianite was found near Barstow, San Bernardino County, Cal., in 1915. This paper describes not only the California deposits but the chief commercially productive strontium deposits of Europe, in England, Sicily, and Germany. The permanence of the industry in this country is thought to depend on the adoption of the strontia process by American beet-sugar refineries; and this, in turn, probably depends on the assurance of a regular supply of strontium hydrate at a reasonable price.

BULLETIN 660-J. Possibilities for manganese ore on certain undeveloped tracts in Shenandoah Valley, Va., by D. F. Hewett, G. W. Stose, F. J. Katz, and H. D. Miser. 1918. Pp. 271-296, figs. 26-33.

This report aims to present briefly the results of field work in a part of Virginia where many manganese deposits are known. The examination was directed toward the discovery of areas likely to contain manganese, with the aid of data gathered in a study of the geologic relations of known deposits. Northwestern Virginia has long been the source of much of the manganese ore mined in the

United States. The deposits lie along the east side of the Shenandoah Valley, at the foot of the Blue Ridge, and this examination covered a narrow belt about 85 miles long, at the center of which is the most productive mine in this area—the Crimora. Six undeveloped tracts are recommended as presenting features favorable for the accumulation of deposits of manganese and manganiferous iron ores, and the paper contains sketch maps showing the location of each tract and the general geology in its vicinity. The field work was done in cooperation with the Virginia Geological Survey, which will publish a more detailed report.

This pamphlet contains a title-page, table of contents, introduction, and index (pp. i-viii, 297-304) for the use of those who may wish to bind the separate chapters of Bulletin 660.

Parts of Bulletin 661, Contributions to economic geology, 1917, Part II, as follows:

Bulletin 661-B. Structure of the northern part of the Bristow quadrangle, Creek County, Okla., with reference to petroleum and natural gas, by A. E. Fath. 1917. Pp. 69-99, Pls. III-VI, figs. 14-18.

Describes a part of the Bristow quadrangle, in Creek County, northeastern Oklahoma, within which, although it is bordered by some of the most productive oil fields of the State, only a few gas wells had been drilled and a very small quantity of oil had been found. The area described contains several anticlines, a few of which appear to be well worth prospecting with the drill. The paper contains a map showing topography and geologic structure, a number of well records, and descriptions of localities where the structure is favorable or unfavorable for the accumulation of oil.

Bulletin 661-C. The De Soto-Red River oil and gas field, La., by G. C. Matson and O. B. Hopkins. 1917. Pp. 101-140, Pls. VII-X, figs. 19-21.

Describes an oil and gas field in northwestern Louisiana, 30 miles southeast of Shreveport and 45 miles south of the Caddo oil and gas field. Gas was discovered in the De Soto Parish in 1912, and oil a year later. The first oil well in Red River Parish was drilled in 1914. The total production of the field has probably been over 12,000,000 barrels. The report contains a map showing the structure, numerous well logs, and a table of analyses of oil from this and neighboring fields.

Bulletin 661-D. The Irvine oil field, Estill County, Ky., by E. W. Shaw. 1917. Pp. 141-191, Pls. XI-XV, figs. 22-28.

Describes an oil field which has received little publicity but which in November, 1916, was producing about 5,000 barrels a day, or more than all the other oil fields in Kentucky combined. The oil-bearing rock lies near the surface in the valley bottoms, and drilling is inexpensive, but the country is rough and transportation of machinery and supplies to the wells is difficult. The output has been limited by insufficient facilities for marketing, and the wells have not been forced to their full capacity. This report gives a full discussion of the geology of the field and includes sections on the structure and the character and origin of the oil, statistics and diagrams showing the production, and suggestions for prospecting. Structure and sketch maps and views of structural features are included in the illustrations.

Bulletin 661-E. The Bowdoin dome, Mont., a possible reservoir of oil and gas, by A. J. Collier. 1917. Pp. 193-209, Pl. XVI, fig. 29.

The discovery of a small flow of gas, favorable geologic structure, and the presence within moderate depth of strata that might be sources of petroleum are suggested as warranting a test of the area near Bowdoin, in northeastern Montana, about 40 miles south of the Canadian boundary. The author describes the geology of the area and gives a structure map.

BULLETIN 661-F. The Corsicana oil and gas field, Tex., by G. C. Matson and O. B. Hopkins. 1917. Pp. 211-252, Pls. XVII-XXI, figs. 30-32.

The Corsicana oil and gas field. in Navarro County, Tex., embraces a number of productive pools covering in the aggregate about 50 square miles, within an area that measures 20 miles from north to south by 10 miles from east to west. Although this field has been productive for more than 20 years, little has been written concerning the geology of the field and the structural conditions under which the pools of oil and gas have accumulated. The purpose of this report is to give a more complete account than has yet been printed of the history, production, and geology of the field, with especial reference to the structure and the age and relations of the oil sands. Information obtained from the study of this field should be applicable to other areas in the same general region where the geologic conditions are similar. Although the field has already been extensively drilled, a few suggestions are made for future development. The illustrations comprise structure and geologic maps and diagrams showing well records and production.

BULLETIN 661-G. The Palestine salt dome, Anderson County, Tex.; The Brenham salt dome, Washington and Austin counties, Tex.; papers by O. B. Hopkins. 1917. Pp. 253-280, Pls. XXII-XXV.

These papers describe two small salt domes in which interest has been aroused because of the discovery of tarry oil in water wells a few miles from each dome. Salt was produced from the Palestine dome before 1890, and the industry has recently been revived. No evidence of oil has been found there, and the geologic conditions suggest that no large amount remains, even if it ever accumulated, The author points out the area where the conditions are most favorable for oil. if any is present in this dome. In the Brenham dome one well drilled in 1915 obtained a small quantity of oil, and 13 others had been drilled by April, 1917, but the results were discouraging. The study of the area failed to throw much light on the probable presence and location of oil in the dome, but the paper presents the information at hand, which may be of value to anyone who continues drilling in this area.

BULLETIN 661-H. Oil and gas possibilities of the Hatchetigbee anticline, Ala., by O. B. Hopkins. 1917. Pp. 281-313, Pls. XXVI-XXIX.

One of the first deep wells drilled for oil in the Gulf Coastal Plain was put down in 1884-85 at Bladon Springs, Ala., near the crest of the Hatchetigbee anticline. At that time the anticlinal theory of oil and gas accumulation was being much discussed, but the reasons that led to the selection of this site are not known. A little gas was found in this well, but no further work was done here until after the discovery of oil at Beaumont, Tex., in 1901. In the next four or five years six deep wells were drilled in this area, but all were poorly located with reference to the structure. Interest in the area has been revived recently, and this report presents the results of a geologic examination by the Survey. A number of areas in which the structure is favorable for the accumulation of oil and gas were found. The report contains a geologic map and sections, views of fossils, and well logs.

BULLETIN 661-I. Phosphatic oil shales near Dell and Dillon, Beaverhead County, Mont., by C. F. Bowen. 1918. Pp. 315-320, fig. 33.

A report on oil shale at two localities in southwestern Montana. The shale occurs at about the same geologic horizon as the phosphate deposits of this general region. Laboratory tests have shown that the phosphate is not driven off by distillation, and the fact that the shale yields oil on distillation and yet retains a notable quantity of phosphate in the ash presents to the technologist a problem whose solution may be economically as valuable as it is scientifically interesting.

This pamphlet contains a title-page, table of contents, introduction, and index (pp. i-viii, 321-328) for the complete volume of Bulletin 661, for the use of those who wish to bind the separate chapters.

Parts of Bulletin 662, Mineral resources of Alaska, report on progress of investigations in 1916, as indicated below. The annual report on Alaskan investigations is issued first in the form of advance chapters. This report is the thirteenth of the series and contains 15 papers by 11 authors, arranged on the same plan as in previous volumes. In the papers dealing with the economic geology of certain districts special emphasis is laid on the conclusions having immediate interest to the miner. The papers listed below comprise all to be included in the volume for 1916, but the volume itself had not yet been issued June 30, 1918.

BULLETIN 662-A. Preface; Administrative report; The Alaskan mining industry in 1916, by A. H. Brooks. 1917. Pp. 1-62, i-xi, Pls. I-IV.

BULLETIN 662-B. Mining developments in the Ketchikan and Wrangell mining districts, by Theodore Chapin; Lode mining in the Juneau gold belt, by H. M. Eakin; Gold placer mining in the Porcupine district, by H. M. Eakin; Water-power investigations in southeastern Alaska, by G. H. Canfield. 1917. Pp. 63-154, Pls. V-IX, fig. 1.

BULLETIN 662-C. Mining in the lower Copper River basin, by F. H. Moffit; Mining on Prince William Sound, by B. L. Johnson; Copper deposits of the Latouche and Knight Island districts, Prince William Sound, by B. L. Johnson. 1917. Pp. 155-220, Pls. X-XII, figs. 2-4

BULLETIN 662-D. The gold placers of the Tolovana district, by J. B. Mertie, jr. 1917. Pp. 221-277, Pls. XIII-XIV, figs. 5-6.

BULLETIN 662-E. Mineral resources of the Kantishna region, by S. R. Capps. 1917. Pp. 279-331, Pl. XV, fig. 7.

BULLETIN 662-F. Gold placers of the Anvik-Andreafski region, by G. L. Harrington. 1917. Pp. 333-349, Pl. XVI.

BULLETIN 662-G. Lode deposits near the Nenana coal field, by R. M. Overbeck; Gold placers near the Nenana coal field, by A. G. Maddren. 1917. Pp 351-402, Pl. XVII.

BULLETIN 662-H. Lode mining in the Fairbanks district, by J. B. Mertie, jr. 1917. Pp. 403-424, Pl. XVIII, fig. 8.

BULLETIN 662-I. Lode mining and prospecting on Seward Peninsula; Placer mining on Seward Peninsula, by J. B. Mertie, jr. 1917. Pp. 425-458.

BULLETIN 663. The structural and ornamental stones of Minnesota, by Oliver Bowles. 1918. 225 pages, 21 plates, 27 text figures.

Gives a summary of the history of the stone industry in Minnesota, describes the rocks of the State and their constituent minerals, and presents an outline of the geologic history. The main body of the report consists of detailed descriptions of the quarries, their products, mode of operation, equipment, ownership, and means of transportation. As a guide for prospective operators undeveloped outcrops are also described. The first stone quarry in Minnesota was opened in 1820 to obtain limestone for use in building part of old Fort Snelling. At present the building and ornamental stones produced in the State, though far less valuable than the iron ores, rank second in value in Minnesota's mineral output. The paper contains numerous illustrations showing features of the stones, including several reproducing the stones in their natural colors, as well as notable structures in which these stones have been used.

This bulletin is to be followed by similar ones covering other States, to be prepared by the Survey in cooperation with the Bureau of Mines, the Bureau of Standards, and the geological surveys of the States interested.

Bulletin 665. Bibliography of North American geology for 1916, with subject index, by J. M. Nickles. 1917. 172 pages.

A list, arranged alphabetically by authors' names, of publications on the geology of the Continent of North America and adjacent islands, also Panama and the Hawaiian Islands, issued in 1916. The book is indexed and contains lists of chemical analyses reported and of minerals, rocks, and geologic formations described.

Parts of Bulletin 666, Our mineral supplies, as follows:

Bulletin 666–Q. Copper, by B. S. Butler. 1917. 4 pages, 1 plate.

Bulletin 666–R. Limestone and lime, by G. F. Loughlin. 1917. 6 pages.

Bulletin 666–S. Portland cement, by E. F. Burchard. 1917. 5 pages, 1 text figure.

Bulletin 666–U. The rarer metals, by F. L. Hess. 1917. 13 pages.

Bulletin 666–V. Iron, by E. F. Burchard. 1917. 12 pages, 1 text figure.

Bulletin 666–X. Mica, monazite, and lithium minerals, by W. T. Schaller. 1917. 6 pages.

Bulletin 666–Y. Zinc, by C. E. Siebenthal. 1917. 4 pages.

Bulletin 666–Z. Nitrates, by H. S. Gale. 1917. 4 pages.

Bulletin 666–AA. Lead, by C. E. Siebenthal. 1917. 3 pages.

Bulletin 666–BB. Magnesite, by H. S. Gale. 1917. 3 pages.

Bulletin 666–CC. Fluorspar, by E. F. Burchard. 1917. 8 pages, 1 text figure.

Bulletin 666–DD. Petroleum, by J. D. Northrop. 1917. 13 pages, 1 text figure.

Bulletin 666–EE. Manganiferous iron ores, by E. C. Harder. 1917. 13 pages.

Bulletin 667. The Cosna-Nowitna region, Alaska, by H. M. Eakin. 1918. 54 pages, 8 plates, 3 text figures.

Gives results of a study of a previously unexplored region in central Alaska that promised both to furnish a feasible route of travel for pack trains and to yield information on the character of the bedrock. The region is fairly accessible, is well timbered, and includes much fertile land similar to that near Fairbanks. It has produced no mineral wealth, but some of the geologic formations are similar to those which are gold bearing in neighboring districts, and workable placers may possibly be found in this region. The author points out the most favorable places to search for such deposits. The report contains topographic and geologic maps and other illustrations.

Bulletin 670. The Salt Creek oil field, Wyo., by C. H. Wegemann. 1918. 52 pages, 7 plates, 2 text figures.

Describes the Salt Creek oil field, which produces daily 10,000 barrels of high-grade paraffin oil and is one of the largest proved fields in Wyoming. This field includes an area of about 7 square miles lying 40 miles due north of Casper. The author describes also two adjacent pools—the Shannon pool, where the first oil obtained in this region was found, in 1889, and the Teapot dome, which has not yet been thoroughly tested. The report contains maps of the Salt Creek and Shannon fields and estimates of future production.

Bulletin 675. The upper Chitina Valley, Alaska, by F. H. Moffit, with a description of the igneous rocks by R. M. Overbeck. 1918. 82 pages, 13 plates, 2 text figures.

Presents the results of a recent survey of the Chitina Valley. Although this report deals largely with the more purely scientific aspects of the geologic problems offered by this region, the solution of these problems has a definite economic value. The copper-bearing rocks that contain valuable deposits in the lower part of the Chitina Valley occur also in the upper part, and the formations from which the Nizina placers have derived their gold are present in this region. No mineral deposits of proved value have yet been exploited in this part of the valley, but so far little prospecting has been done here. The report contains topographic and geologic maps and illustrations showing features of geologic interest.

Parts of Bulletin 690, Contributions to economic geology, 1918, Part I, as follows:

BULLETIN 690-A. Zinc carbonate and related copper carbonate ores at Ophir, Utah, by G. F. Loughlin. 1917. Pp. 1-14, figs. 1-4.

The zinc carbonate ore of the Ophir district, of which shipments were first made in 1913, presents some very interesting features. These are discussed in this paper, which forms a contribution to the literature on the genesis of oxidized zinc ores.

BULLETIN 690-B. Gravel deposits of the Caddo Gap and De Queen quadrangles, Ark., by H. D. Miser and A. H. Purdue. 1918. Pp. 15-29, Pls. I-III, figs. 5-6.

Interest in possible American sources of flint pebbles or substitutes for them to be used in tube mills has been aroused since the beginning of the war, owing to the partial interruption of imports of flint pebbles from Denmark and France, which formerly supplied most of the pebbles used in this country. This report describes the gravels in the area covered and discusses the possibility of their use in tube mills. The gravels consist largely of novaculite, a rock as hard as quartz though somewhat less resistant to abrasion. The paper contains a map of the area and an illustration showing characteristic pebbles.

BULLETIN 690-C. A geologic reconnaissance of the Uinta Mountains, northern Utah, with special reference to phosphate, by A. R. Schultz. 1918. Pp. 31-94, Pls. IV-V, fig. 7.

Describes the practically unknown phosphate deposits that occur in the Uinta Mountains, in northern Utah, in the same formation as in the neighboring and better-known phosphate fields of Idaho, Montana, Utah, and Wyoming. The reconnaissance examination on which the paper is based showed that about 225,000 acres in this region may tentatively be regarded as containing valuable deposits of phosphate. These lands have been included in the phosphate reserve approved May 11, 1915. The paper contains maps showing the location of the deposits.

BULLETIN 690-E. Manganese at Butte, Mont. by J. T. Pardee. 1918. Pp. 111-130.

Describes the manganiferous gangue of the silver-zinc lodes at Butte, which was formerly regarded merely as waste rock but which under the present high prices is a possible source of considerable manganese. The amount of this material is very large, but only a small part of that in the oxidized zone, in the outcrops and the upper parts of the lodes, meets present trade requirements. This reserve of material containing 40 per cent or more of manganese, is estimated at 2,600 tons. In addition, however, there is about 132,000 tons of material averaging 24 per cent of manganese. The unoxidized material that contains 15 per cent or more of manganese and lies within depths ordinarily reached in mining amounts to millions of tons, and whether it can be utilized as a source of manganese is a problem of metallurgy rather than of mining.

Parts of Bulletin 691, Contributions to economic geology, 1918, Part II, as follows:

BULLETIN 691-A. The structure of parts of the central Great Plains, by N. H. Darton. 1918. Pp. 1-26, Pls. I-IV, figs. 1-18.

Although oil has been found at only a few localities in the central Great Plains region, there are in this region many favorable structural features, such as domes and anticlines, and a presentation of all available facts as to structural conditions in the region was believed to be warranted by the prevailing great interest in the possibility of the occurrence of oil and gas. The paper contains a map showing the structure of the region by underground contours, also numerous diagrams and sections, and points out the most favorable places for testing with the drill.

BULLETIN 691-B. Oil shale of the Uinta Basin, northeastern Utah, and Results of dry distillation of miscellaneous shale samples; papers by D. E. Winchester 1918. Pp. 27-55, Pls. V-XII, fig. 19.

Gives results of an investigation of the zone of oil shale along the south side of the Uinta Basin, in which the shale was found to be of minable thickness and as rich as those mined in Scotland, if not richer. On the north side of the basin the shale is concealed beneath younger rocks, but it is estimated from the available evidence that the portion of the basin that lies in Utah contains sufficient shale to produce 42,800,000,000 barrels of shale oil, with perhaps 500,000,000 tons of ammonium sulphate as a by-product. The shale must be mined like coal and then crushed and distilled in huge retorts, giving off crude shale oil, ammonia, and fuel gas as the valuable products. Over 80 samples distilled in a field apparatus gave yields ranging from 1 to 90 gallons of oil to the ton of shale. The author gives a diagram illustrating processes of manufacture in the Scottish mineral-oil industry.

BULLETIN 691-C. Geologic structure of the northwestern part of the Pawhuska quadrangle, Okla., by K. C. Heald. 1918. Pp. 57-100, Pls. XIII-XV, figs. 20-30.

Describes those geologic features of a part of the Pawhuska quadrangle, in Osage County, Okla., that bear on the occurrence, discovery, and development of commercial quantities of oil or gas. The rocks that crop out in the area are shown in a generalized stratigraphic section, but the characteristics and extent of certain beds that are of value in mapping the structure of the area are described fully. Both regional and local structure are shown on the structure map that accompanies the paper. The two producing fields are in widely separated parts of the area; in the intervening territory not even a trace of oil or gas has yet been found. The author gives a list of localities in the unproved area where the conditions are most favorable for test drilling.

BULLETIN 691-H. Geology and oil prospects of the Salinas Valley-Parkfield area, Cal., by W. A. English. 1918. Pp. 219-250, Pls. XXVII-XXVIII, figs. 35-36.

Describes an area in the southern Coast Ranges of California, extending from the country west of Salinas River eastward to the crest of the Diablo Range. East of this range is San Joaquin Valley, along whose west edge lie the largest productive oil fields of the State. No productive wells have been drilled in the area examined, and by far the larger part of it offers little encouragement for wildcat drilling, but certain localities appear to be well worth testing. These localities are described in detail, with reasons for the author's conclusions. The paper contains geologic maps of the area and a sketch of conditions in adjacent productive fields.

WATER-SUPPLY PAPER 389. Surface water supply of the United States, 1914, Part IX Colorado River basin; N. C. Grover, chief hydraulic engineer; Robert Follansbee, E. A. Porter, C. C. Jacob, and G. A. Gray, district engineers. 1917. 198+xxxiii pages, 2 plates.

WATER-SUPPLY PAPER 390. Surface water supply of the United States, 1914, Part X, The Great Basin; N. C. Grover, chief hydraulic engineer; E. A. Porter, H. D. McGlashan, F. F. Henshaw, and G. C. Baldwin, district engineers. 1917. 306+xxxiii pages, 2 plates.

These papers present briefly the results of measurements of stream flow in the basins named in the titles during the calendar year 1915. Data for gaging stations are given under the following heads: Location, Drainage area, Records available, Gage, Discharge measurements, Channel and control, Extremes of discharge, Ice, Diversions, Regulation, Accuracy, and Cooperation. The books contain also tables giving gage heights and daily and monthly discharges at each station and halftone plates representing typical gaging stations, current meters, and automatic water-stage recorders. At the end of each book is a list of all gaging stations maintained in the drainage basins covered and an annotated list of publications issued by the United States Geological Survey relating specifically to the region, as well as a similar list of reports that are of general interest, covering a wide range of hydrologic subjects, and brief references to reports published by State and other organizations.

WATER-SUPPLY PAPER 400. Contributions to the hydrology of the United States, 1916; N. C. Grover, chief hydraulic engineer. 1917. 108 pages, 7 plates, 11 text figures.

Contains the following papers, previously issued as advance chapters:

The people's interest in water-power resources, by G. O. Smith.

Artesian water for irrigation in Little Bitterroot Valley, Mont., by O. E. Meinzer.

The measurement of silt-laden streams, by R. C. Pierce.

Accuracy of stream-flow data, by N. C. Grover and J. C. Hoyt.

Ground water for irrigation in the Morgan Hill area, Cal., by W. O. Clark.

WATER-SUPPLY PAPER 401. Surface water supply of the United States, 1915, Part I, North Atlantic slope drainage basins; N. C. Grover, chief hydraulic engineer; C. H. Pierce, C. C. Covert, and G. C. Stevens, district engineers. 1917. 155+xxxvi pages, 2 plates.

WATER-SUPPLY PAPER 403. Surface water supply of the United States, 1915, Part III, Ohio River basin; N. C. Grover, chief hydraulic engineer; A. H. Horton and W. E. Hall, district engineers. 1917. 175+xxxiv pages, 2 plates.

WATER-SUPPLY PAPER 404. Surface water supply of the United States, 1915, Part IV, St. Lawrence River basin; N. C. Grover, chief hydraulic engineer; W. G. Hoyt, A. H. Horton, C. C. Covert, and C. H. Pierce, district engineers. 1917. 122+xxxi pages, 2 plates.

WATER-SUPPLY PAPER 406. Surface water supply of the United States, 1915, Part VI, Missouri River basin; N. C. Grover, chief hydraulic engineer; W. A. Lamb and Robert Follansbee, district engineers. 1917. 281+xli pages, 2 plates.

WATER-SUPPLY PAPER 408. Surface water supply of the United States, 1915, Part VIII, Western Gulf of Mexico basins; N. C. Grover, chief hydraulic engineer; G. A. Gray, W. E. Hall, and Robert Follansbee, district engineers. 1917. 111+xxvi pages, 2 plates.

Similar to the reports for 1914 noticed above.

WATER-SUPPLY PAPER 418. Mineral springs of Alaska, by G. A. Waring, with a chapter on the chemical character of some surface waters of Alaska, by R. B. Dole and A. A. Chambers. 1917. 114 pages, 9 plates, 16 text figures.

Hot springs are widely distributed in Alaska, but they were only slightly used by the natives before the coming of the white man. Since the Russian occupation, however, they have been gradually coming into use, and a number of bathing establishments have been constructed at some of the more accessible springs. A demand has arisen for more accurate information about the qualities of the thermal waters, and to meet this demand Mr. Waring undertook the investigation whose results are here set forth. Besides his own observations he compiled all available information about mineral springs in Alaska, and the paper contains data concerning 109 springs. Samples of stream waters were analyzed, and the results, though meager, constitute the only published information so far available to show the composition of surface waters in subpolar regions, where the conditions of erosion and ground-water circulation are very different from those in more temperate regions. The book contains maps and views of some of the springs.

WATER-SUPPLY PAPER 424. Surface waters of Vermont, by C. H. Pierce. 1917. 218 pages, 14 plates, 2 text figures.

From the days of the earliest settlement the rivers of Vermont have figured largely in her growth and development, and now there is hardly a town in the State which is not dependent in some way on power derived from falling water. How the waters of Vermont can be best used to serve the interests of her citizens is a vital question. Fortunately pure water is abundant, but before construction of a power plant is undertaken it is necessary to have data showing the power available and whether the run-off, on which the effective power will depend, will be so distributed throughout the year as to correspond to the requirements of the market. The Geological Survey has established 25 gaging stations on streams in Vermont, and this paper gives all records collected at these stations and all other available records of river discharge collected in Vermont or on the borders. The illustrations include a map of the State, three maps showing river profiles, and views of gaging stations and power plants. At the end of the volume is given a gazetteer of streams, lakes, and ponds in Vermont.

Parts of Water-Supply Paper 425, contributions to the hydrology of the United States, 1917, as follows:

WATER-SUPPLY PAPER 425-B. Ground water for irrigation in Lodgepole Valley, Wyoming and Nebraska, by O. E. Meinzer. 1917. Pp. 37-69, Pls. IV-VI, fig. 3.

Contains results of a brief field investigation of the drainage basin of Lodgepole Creek, a long, narrow belt between the much larger basins of the North Platte and South Platte. The investigation was made in response to repeated requests from residents of the valley who are interested in projects for extending irrigation by pumping shallow ground water or by discovering artesian water. The paper contains data on cost of pumping for irrigation, by H. C. Diesem, of the United States Department of Agriculture.

WATER-SUPPLY PAPER 425-C. Hydraulic conversion tables and convenient equivalents. 1917. Pp. 71-94.

Gives many tables and equivalents of practical use to hydraulic engineers.

WATER-SUPPLY PAPER 426. Southern California floods of January, 1916, by H. D. McGlashan and F. C. Ebert. 1918. 80 pages, 17 plates.

The rains that swept southern California in January, 1916, converted the streams into torrents that overran their banks and devastated large areas of the most fertile land in the State. The floods wrought widespread ruin throughout the region that extends southward from Santa Clara River to the Mexican boundary and westward from the north-south ranges of San Bernardino and Santa Clara counties to the ocean. A record of the magnitude of such a flood and a study of the damage done and of previous floods are of value not only in efforts to solve the general problem of flood prevention but also in planning the complete utilization of the water resources of a region. In San Diego County, especially, where the losses were very heavy, a number of feasible reservoir sites have not been developed because the expense is apparently not yet warranted by the demand for their utilization for water supply alone. A detailed study may show, however, that the value of these sites as reservoirs for flood protection is sufficient to justify the county in assuming part of the cost of construction or assessing it against the properties to be protected. A fundamental requirement for this study is a knowledge of precipitation and stream flow, such as that presented in the records given in this paper. The records of precipitation were collected at 156 stations and those of stream flow at 38 stations. The paper is illustrated by numerous views showing flood damage and contains a map of the area.

WATER-SUPPLY PAPER 430. Surface water supply of Hawaii, July 1, 1913, to June 30, 1915; N. C. Grover, chief hydraulic engineer; G. K. Larrison, district engineer. 1917. 329 pages.

Similar in scope to Water-Supply Papers 389 and 390, noticed on pages 27-28.

WATER-SUPPLY PAPER 431. Surface water supply of the United States, 1916, Part I, North Atlantic slope drainage basins; N. C. Grover, chief hydraulic engineer; C. C. Covert, C. H. Pierce, and G. C. Stevens, district engineers. 1918. 175 + xxxvi pages, 2 plates.

WATER-SUPPLY PAPER 434. Surface water supply of the United States, 1916, Part IV, St. Lawrence River basin; N. C. Grover, chief hydraulic engineer; W. G. Hoyt, A. H. Horton, C. C. Covert, and C. H. Pierce, district engineers. 1917. 130 + xxxii pages, 2 plates.

WATER-SUPPLY PAPER 437. Surface water supply of the United States, 1916, Part VII, Lower Mississippi River basin; N. C. Grover, chief hydraulic engineer; Robert Follansbee, district engineer. 1918. 49 + xxxii pages, 2 plates.

WATER-SUPPLY PAPER 438. Surface water supply of the United States, 1916, Part VIII, Western Gulf of Mexico basins; N. C. Grover, chief hydraulic engineer; G. A. Gray and Robert Follansbee, district engineers. 1917. 106 + xxvi pages, 2 plates.

WATER-SUPPLY PAPER 445. Surface water supply of Hawaii, July 1, 1915, to June 30, 1916; N. C. Grover, chief hydraulic engineer; G. K. Larrison, district engineer. 1917. 224 pages.

Similar in scope to Water-Supply Papers 389 and 390, noticed on pages 27-28.

MINERAL RESOURCES OF THE UNITED STATES, 1915. 1917. Part I, Metals; H. D. McCaskey, geologist in charge; iv + 99a + 1,000 pages, 3 plates, 7 text figures. Part II, Nonmetals; E. F. Burchard, geologist in charge; vi + 1,084 pages, 7 plates, 36 text figures.

Statistics of the production, importation, and exportation of mineral substances in the United States, including accounts of the chief features of mining progress, comparisons of past and present production and conditions, and the application of the products in the useful arts. Contains an insert showing production of coal in the United States, 1807-1915. Issued first. as received, in 66 advance chapters, each covering a single mineral product or group of allied products.

MINERAL RESOURCES OF THE UNITED STATES, 1916. Fifty-five advance chapters.

MINERAL RESOURCES OF THE UNITED STATES, 1917. Six advance chapters.

GEOLOGIC FOLIO 207. Deming, N. Mex., by N. H. Darton. 1917. 15 folio pages of text, 3 maps, 1 structure-section sheet, 9 plates, 11 text figures.

Description and maps of the Deming quadrangle, covering about 1,009 square miles in Luna County, N. Mex.

TOPOGRAPHIC AND OTHER MAPS as follows:

Agua Fria, Tex.[1]
Arbuckle, Cal.
Arena, Cal.
Atwater, Cal.
Avery, Idaho-Mont.
Bainbridge, Ohio.
Barwise School, Tex.
Battle Creek, Mich.[1]
Belfast, Maine.
Belvidere, Ill.[1]
Birds Landing, Cal.
Bladen, Ga.[1]
Brainerd, Minn.
Brownfield, Ill.-Ky.
Buck Hill, Tex.[1]
Burkburnett, Tex.-Okla.
Camel Mountain, N. Mex.[1]
Camp Dix, N. J.-Pa.[2]
Camp Sherman, Ohio.[3]
Chesaning, Mich.
Christmas, Ariz.
Clara, Tex.-Okla.
Columbus, N. Mex.[1]
Compton Landing, Cal.
Coulterville, Ill.
Cowen, W. Va.
Cranes Flat, Idaho.
Del Norte, Colo.
Dover, N. H.-Maine.[4]
Eminence, Mo.
Fairfield, Utah.
Galesburg, Mich.[1]
Gantts Quarry, Ala.
Garrison, Ohio.[5]
Gustine, Cal.
Hamilton, Ohio.[6]
Hermanas, N. Mex.[1]
Higginsport, Ohio.[5]
Hillsboro, Ohio.
Hillsboro, Oreg.-Wash.
Hilo, Hawaii.
Idaho (State, 1:500,000).[7]
Jordan Gap, Tex.[1]
Kings, Ill.[1]
Kirkland, Ill.[1]
Knobnoster, Mo.
Koehler, N. Mex.
Lamoure, N. Dak.[8]
Lawtey, Fla.[1]
Leonidas, Mich.[1]
Logan Creek, Cal.[8]
Lower Matanuska Valley Alaska.
Macclenny, Fla.-Ga.[1]
Matewan, W. Va.-Ky.-Va.[9]
Millsboro, Del.[1]
Moira, N. Y.
Moorcroft, Wyo.
Morattio, Va.[1]
Morgan Hill, Cal.
Mount Riley, N. Mex.[1]
Naugatuck, Ky.-W. Va.[9]
Neshkoro, Wis.
New Effington, S. Dak.-N. Dak.

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[1] Photolithograph in colors.

[2] Covers Bordentown quadrangle and parts of Whiting, Cassville, and Pemberton quadrangles.

[3] Covers Roxabell and Chillicothe quadrangles.

[4] Resurvey.

[5] Preliminary edition showing part of quadrangle.

[6] New and enlarged edition covering Hamilton quadrangle and part of Harrison quadrangle.

[7] Photolithograph.

[8] New edition.

[9] Sheet completed; part engraved in 1912.

Newman, Cal.
Noria, N. Mex.[1]
Oahu, Hawaii.
Oneonta, N. Y.
Otway, Ohio.
Paintsville, Ky.
Pasco, Wash.
Passadumkeag, Maine.
Pelican Rapids, Minn.
Piketon, Ohio.
Planada, Cal.
Prestonsburg, Ky.
Princeton, Cal.
Prosser, Wash.
Regina, Ky.-Va.[2]
Reserve, N. Mex.
Rochester, Vt.
Rockford, Ill.-Wis.[1]
Russell, N. Y.
Salem, Oreg.
San Simon, Ariz.-N. Mex.
Sardinia, Ohio.
Sites, Cal.[3]
Stevinson, Cal.
Superior, Wis.-Minn.
Tappahannock, Va.[1]
Tascotal Mesa, Tex.[1]
Toano, Va.[1]
Union City, Mich.[1]
United States (showing oil and gas fields in 1916).
Uniontown, Ky.-Ind.
Vicksburg, Miss.-La.
Wallula, Wash.
Webster Springs, W. Va.[4]
White Rock, S. Dak.-Minn.-N. Dak.
Williams, Cal.
Winton, Cal.
Wisconsin (State, 1:1,000,000).[5]
Wolfskill, Cal.

GEOLOGIC BRANCH.

SCOPE AND ORGANIZATION OF WORK.

Primarily the work of the geologic branch includes "the examination of the geological structure, mineral resources, and products of the national domain" and "the preparation of a geological map of the United States." Its operations extend to every region of the country and to nearly every field of geology; it has both fostered scientific geologic research and taken a leading part in the development of the mineral resources of the country through its field investigations of the mineral deposits and its accounting of the minerals produced. During later years it has become a national bureau of public information on geologic matters relating not only to all parts of the United States and Alaska but to other countries as well.

The geologic branch is under the immediate charge of the chief geologist, David White, and is organized in four divisions, as follows: (1) Division of geology, in charge of the chief geologist until May 15, when on account of the growing administrative demands due to the war the immediate charge of the division was placed in the hands of Sidney Paige, geologist; (2) division of Alaskan mineral resources, in charge of George C. Martin during the absence of Maj. A. H. Brooks in France; (3) division of mineral resources, H. D. McCaskey, geologist in charge; and (4) division of chemical and physical research, G. F. Becker, geologist in charge. The work of each of these divisions is described in the following pages.

PUBLICATIONS OF THE BRANCH.

The publications of the fiscal year 1918 prepared wholly or partly in the geologic branch embrace 6 professional papers, 11 bulletins, etc., 120 chapters of reports to be published later as annual volumes, and 1 geologic folio. Titles and brief abstracts of these publications are given on pages 12–30. Besides the official publications 42 papers were, with the permission of the Director, published by scientific societies or elsewhere in scientific and technical journals. Six reports based on work done in cooperation with State geological surveys have been transmitted to the States for publication.

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[1] Photolithograph in colors.

[2] Sheet completed; part engraved in 1915.

[3] Preliminary edition showing part of quadrangle.

[4] New and enlarged edition covering Webster Springs quadrangle and part of Mingo quadrangle.

[5] Photolithograph.

DIVISION OF GEOLOGY.

ORGANIZATION AND PERSONNEL.

The scientific force of the division of geology at the beginning of the year consisted of 69 geologists, 21 associate geologists, 23 assistant geologists, 7 junior geologists, and 14 geologic aids. During the year four members of the scientific staff resigned to take positions in private life at higher salaries; one member died; one was transferred to another bureau; six entered the Army; eight new members were appointed; and one was transferred from another division. The total number of geologists of various grades on the divisional staff at the end of the year was 131, a net loss of 3.

The organization of the division remained the same as the previous year, except that the increasing urgency of war work and the rapidly changing character of the demands made upon the Survey resulted in temporary redistribution of activities quite out of accord with the formal organization. Thus the work of the two sections of Areal geology was practically suspended; the Coastal Plain investigations were confined essentially to areas having special military importance; the geologic work on metalliferous deposits was limited to the ores of the war metals; coal-field examinations were made only where needed by the Navy Department and the Fuel Administration or in localities where immediate development was desired; work of nonmetals, notably salines, has for several years been on a war basis; oil and gas field investigations were confined to areas of greatest promise of new oil reserves or to the relief of the fuel situation; and the preparation of geologic folios was discontinued to enable the map-printing plant of the Survey to devote all its energies to war work.

The committee on geologic names examined 77 manuscripts, comprising 13,600 pages and involving about 1,975 geologic names.

The physiographic committee supervised the preparation of descriptions of various Army camps of which topographic maps are available and continued the preparation of the geographic handbooks of (1) Virginia, West Virginia, Maryland, and Delaware and (2) the New England States, begun last year.

FINANCIAL STATEMENT.

The total funds available for the geologic work of the Survey for the fiscal year 1918 were as follows:

Geologic surveys	$350,000
Statutory salaries	13,700
Search for potash deposits (part of the appropriation for chemical and physical researches)	19,410
	383,110

The expenditures, classified by projects, were approximately as follows:

Iron and steel alloy metals	$50,317
Platinum, mercury, copper, and other metals	26,479
Potash, nitrates, and other salts	25,496
Phosphates, cements, and other nonmetalliferous deposits	11,828
Oil and gas	77,705
Coal	21,440
Examinations of Army and Navy training camps, stations, and surroundings	5,468
Collection of geologic information of military importance	6,195
Geographic manuals	10,760
Compilation of information concerning foreign mineral resources	10,185
Areal investigations	9,391
Glacial and Coastal Plain investigations	7,900
Paleontologic investigations	13,398
Geologic-map editing	271
Special structural studies of Great Basin region	2,479
Supervision, administration, salaries of clerical, technical, and skilled labor forces, instruments, supplies, and contingent fund	85,798
	365,110
Land-classification board	18,000
	383,110

COOPERATION WITH OTHER GOVERNMENTAL AND STATE AGENCIES.

The widened scope of operations due to the special and highly diverse demands presented to the Survey by the war boards and other departments of the Government has led to corresponding expansion in cooperative response. The range in governmental activities to which the Survey has been called to make geologic contributions and the groups which have taken part in this work are roughly indicated in the accompanying diagram (Pl. II). To recite the list of subjects and the nature of the investigations would take too much space here, however interesting such a review might be to the reader. Most of the projects are specifically mentioned in the detailed account of the work in the different States.

Besides cooperating in the investigation of special war problems the Survey has cooperated in work either distinctly essential to the war industries or required by the programs of other organizations both Federal and in the States. The metallographic study of ores was continued in cooperation with the Bureau of Mines and later jointly placed at the service of the Ordnance Department of the War Department. The Bureau of Standards, the Bureau of Mines, and the Office of Public Roads have cooperated in the investigation and testing of building stones, clays, and road materials, and the Coast and Geodetic Survey in the determination of gravity at stations selected by the Survey with reference both to isostasy and the detection of mineral deposits of economic importance. Numerous field examinations have been made for the Department of Justice, the War Department, the Navy Department, the Bureau of Mines, the Bureau of Standards, the General Land Office, the Office of the Supervising Architect of the Treasury Department, the Forest Service, and the Office of Indian Affairs. The Indian Office has cooperated with the Survey in the study of the oil lands in the Osage Reservation in Oklahoma. Through the division of geology the Survey has cooperated informally with the Smithsonian Institution, the Weather Bureau, the Bureau of Lighthouses, the Bureau of Fisheries, and the research laboratories of the Carnegie Institution. Assistance has been given to the geologic departments of a number of universities and colleges.

In strictly geologic investigations or paleontologic studies the Survey has cooperated, through the division of geology, with 27 States—Alabama, California, Connecticut, Florida, Georgia, Idaho, Illinois, Indiana, Iowa, Kansas, Kentucky, Maryland, Michigan, Minnesota, Mississippi, Missouri, New Jersey, North Carolina, North Dakota, Ohio, Oklahoma, Pennsylvania, South Dakota, Tennessee, Texas, Virginia, and Wisconsin. Informal cooperation exists between the Survey and all the States having geological surveys.

GENERAL FEATURES OF THE WORK OF THE YEAR.

As stated in the report for last year, the resources of the Survey both in geologists and in funds have been concentrated mainly on the discovery, estimation, and development of domestic deposits of minerals for which the United States was, on its entrance into the great war, more or less fully dependent upon overseas importation. Secondarily the efforts of the geologic branch were devoted to increasing the production of those minerals, not imported, which must be brought forth in far greater amounts than ever before in this country to supply the war necessities of the Allies and to maintain both our military efficiency and our industrial vitality. Deposits of war minerals, not only developed deposits but those that were merely reported or rumored, were hunted down, examined, and inventoried

U. S. GEOLOGICAL SURVE

SPECIAL WAR WORK

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MINERAL FUELS.

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qualitatively and quantitatively, and notes were made as to their capacity under favorable conditions for production. Through press notices, "Contributions to economic geology," articles in the technical journals and publications of technical societies, and memoranda submitted to the different war boards and other governmental agencies concerned with the production of war minerals the data thus gained, together with the information as to the areas deserving testing and development, have been brought to the attention of the public, while at the same time, through the more frequent reports (weekly for some important mineral products) of the division of mineral resources, the Government and the public have been kept informed of the progress of this development as expressed in authentic reports of production by grades and in the best forecasts obtainable.

By way of illustration it may be noted that in the field of iron and steel alloy ores alone deposits were examined at 1,580 localities by 21 geologists in 23 States, Cuba, Porto Rico, and Santo Domingo.

As already noted, the principal object of this work was to provide adequate domestic supplies of these mineral commodities, making the United States independent should importations be forcibly terminated by submarine successes and releasing ships from transporting ores and other minerals from distant sources so that they might carry soldiers and munitions. In this work of military reinforcement and preparedness the Survey enjoyed the cooperation of the Bureau of Mines, which also gave special attention to the mining, milling, and metallurgic problems involved in the extraction and utilization of our domestic ores, and of the Shipping, War Industries, and War Trade boards, which were able to give the prospective producer assurance of his market. Without this cooperation success would have been impossible.

In the development of the domestic supplies of some of the most essential war minerals the results of this campaign have been successful almost beyond expectation. Although when this country entered the war we supplied but 4 per cent of the estimated amount of high-grade manganese ore we needed, over 800,000 tons a year, our domestic supply is now nearly 35 per cent and, with the large reserves of low-grade ore which are being used more widely, can readily be made entirely sufficient for our needs. Pyrite and sulphur are now produced from domestic sources in amounts sufficient to supply the enormously increased number of plants required for munitions, chemicals, and fertilizers, and the supplies are approximately adjusted to the consumption of the plants in operation.

Assiduous effort in discovering deposits of chromite and in encouraging the development of both the new and the producing deposits, coupled with a governmentally fostered conservation in the use of chrome refractory and other materials, has shown that under conditions favoring domestic production the country may be made nearly independent. Partly through the better utilization of the domestic flake and partly through the stabilization of production, domestic graphite has replaced 20 per cent of the imported graphite in the manufacture of crucibles, the most indispensable large use of the mineral, and the country is able to eliminate importations of overseas graphite for other purposes. Sheet mica sufficient to satisfy all but the most exacting needs is known to be present in the United States, though on account of American methods of mining and preparation the product is not acceptable to makers of radio equipment and magnetos. A supply of magnesite in abundant amounts and of qualities to meet every essential use has been demonstrated, and the use of sintered dolomite as a substitute for calcined magnesite has proved successful. High-grade clays, satisfactorily replacing imported clays for the manufacture of electrical porcelain, graphite crucibles, and other indispensable uses, with the possible exception of coating paper, are either being produced or are in the way of being developed. Glass sand of the extreme purity necessary for making high-grade optical glass has, after long search, been located in large quantities in this country; glass pots suitable for its manufacture are produced from the domestic materials, and the United States is now able to furnish satisfactory lenses for its optical instruments.

The search for nitrates, the most indispensable of our war minerals, has not yet been successful. Extensive exploration and sampling of the many reported natural deposits of nitrates, including the caliches of southwestern California, have revealed no supply of this essential constituent of explosives and important ingredient of fertilizers. The continued investigation of brines and buried saliferous deposits, coincident with the search for potash, has been equally fruitless. No nitrate deposit has yet been located that is sufficiently rich and extensive to pay the cost of its development and treatment on a commercial scale, notwithstanding the prevailing very high prices. The examinations are nevertheless of distinct public value, both in checking wasteful and fruitless speculation and investment and in keeping well informed those who are charged with the responsibility of procuring or producing the needed war supplies. The search, which has been made in cooperation with the Nitrate Division of the Ordnance Department of the War Department, has been extended to Guatemala.

The situation in respect to potash is somewhat better and is improving, the rate of production during the first six months of 1918 having been equal to nearly 25 per cent of the normal consumption. By force of circumstances the country is now essentially independent of foreign importations, though at an undetermined cost in the fertility of the soil. Searles Lake, in California, the alkali lakes in western Nebraska, and the alunite deposits of Utah, all of which were examined with favorable recommendations in earlier reports by the Geological Survey, are now our principal sources of supply. From these, as well as from various by-product recoveries, larger and increasing supplies are expected in the last half of 1918 and in 1919, as is detailed in the current chapter on potash in Mineral Resources for 1917.

Hardly less necessary than the effort to develop domestic supplies of the war minerals formerly imported has been the struggle to make the production of petroleum in the United States meet the ever-increasing consumption in this country while better fulfilling our obligations to assist in supplying our allies. The enormous increase in the use of gasoline for warfare in the air, on the sea, and on land, as well as for our essential industrial activities, including vastly increasing motor freight transportation, can be met in part only by the development of processes for greater recovery of gasoline from the crude oils produced. It is too much to hope that the progress of the last few years in this development can be continued at the necessary rate. The effort to increase the production of crude oil must be carried to the farthest limit if the reserve now in storage is not soon to be exhausted. The curtailment of unessential consumption, though palliative, will not do away with the dangerous situation. Unless a great increase can be made in importations, which will require more ships, the most effective remedy and the only one that will avoid hardship and lowered industrial efficiency is an increase in the production of crude petroleum in this country through the discovery and development of new oil reserves. Geologic exploration in promising regions is one of the most practicable and certain steps toward this object. Accordingly, the Geological Survey has concentrated the activities of its oil and gas geologists on the search for anticlines and domes in those regions of the country, such as the Osage Indian Reservation, in Oklahoma, where geologic conditions favorable to the occurrence of oil are known to exist and where the discovery of such a structural feature is likely to lead to the discovery of an oil or gas pool. The results of these structural examinations, many of which have been conducted in cooperation with State surveys, are, at the earliest possible moment, contributed in an informal way to the public for the immediate guidance of the driller to those points where oil may be developed with the least hazard of waste in money, time, labor, equipment, and opportunity through drilling the less promising or even absolutely unfavorable areas. The loss of capital, the waste of opportunity, and the unprofitable employment of strictly limited supplies of drilling materials and of labor that are involved in random drilling, which with competent geologic advice might all be diverted to areas of reasonably favorable geologic structure, constitute an economic loss not only to the operators but to the public.

The investigation, with mapping, of the deposits of oil shale in the West, begun by the Geological Survey in 1913 largely as a measure of preparedness, has yielded a volume of information as to the distribution, richness, character, composition, and possibilities of these shales, which is now proving invaluable in the foundation of a new industry that is sooner or later to be of very great economic importance to the country. The many experimental plants now in operation or under construction for producing oil from these shales for commercial use should soon demonstrate whether, as was expected, the moment has already arrived when the production of shale oil will not only regulate the price of gasoline but will assure an almost unlimited supply of that essential fuel. Conservative estimates of the quantity of crude oil that may be recovered from beds of shale 3 feet or more in thickness and capable of yielding 25 gallons or more of oil to the ton of shale (some beds will yield as high as 70 gallons) indicate that the shales of northwestern Colorado and northeastern Utah alone can produce over 10 times as much oil as has been recovered from oil wells in the United States since the first commercial oil well was drilled in Pennsylvania in 1859. What the full possibilities of these shales may be in the way of by-products other than gasoline remains to be seen. It is not impossible that new products or preparations yet to be discovered in the experimental laboratory may be of signal importance to the country and may radically affect the commercial success of the industry. The tests already made indicate that the shales will furnish material for dyes, fertilizers, rubber substitutes, paving materials, drugs, and lubricants.

Little progress has been made in the regional mapping of coal fields or in the classification of large areas of coal or oil lands. The coal-field geologists have furnished data to the Fuel Administration and to the other branches of the Government concerning highly diverse geologic problems affecting the coal supply, besides examining coal lands in the West where mines were to be opened in order to enlarge the output.

Other war demands, which have occupied the attention of geologists best qualified to meet them, have included the examination of camp and station sites for the Army and Navy with reference to drainage, water supplies, building and road materials; the location of oil and gas reserves for the Army and Navy; the acquisition and compilation of geologic and physiographic information of military importance for reports to the Army engineers; and the examination of mineral deposits concerning which geologic advice has been desired by other bureaus and departments. A fuller account of these activities, which are typically cooperative, is given in the record of the work in the several States.

Less distinctly military in purpose are the popular descriptions of the geographic features in the regions surrounding the principal Army cantonments and their origin and history. These descriptions, printed on the backs of the topographic maps of the regions in which the camps are located, are designed to interest the soldier and, through an attractive and clear explanation of the geographic features of the regions, to create in him a greater interest in and a better understanding of analogous features that he may see in other parts of the country or of the world. Of like nature are two geographic manuals covering the New England and Virginian regions, the publication of which has been delayed by the interruption of the work of the contributors through their assignment to field investigation of deposits of war minerals and by an increase in the elaboration and care in the descriptions.

In geology there is no political boundary. Geologic formations extend beneath frontiers and fortresses, and ores and other useful minerals are deposited in like manner from continent to continent. Accordingly, in anticipation that the Geological Survey would be called upon for information regarding the mineral deposits and production of countries other than our own, several of its specialists in the study of the different kinds of mineral deposits began in December, as a preparedness measure, the compilation of such data. The results of this work more than fulfilled the expectations, and the demands for the information have been so numerous and urgent as to require that the work be placed in the hands of a carefully chosen committee, each member of which is a specialist in his subject. Under the direction of this committee the compilation is now going forward in a comprehensive and thorough manner. In furnishing such information to the various war organizations the geologic branch is only more fully performing its work as the American bureau of information regarding the geology and mineral resources of the world.

Of field examinations and expenditures, other than those relating to war minerals, there have been practically none in the division of geology. Field studies in areal, glacial, and historical geology have been suspended except in several minor investigations, the cost of which has been defrayed by cooperating State surveys to whose plans the work was necessary. Some of the sections of the division of geology have been reduced to administrative skeletons or even to merely nominal existence in order that the combined strength of the division might be utilized in the work that proved most necessary. Accordingly, in the office only a very meager amount of interim progress has been made in the preparation of a relatively small number of reports, though at the same time the scientific organization is ready to resume its normal activities when peace comes. Geologists of national reputation, distinguished as specialists in so-called scientific branches of geology, have thrown themselves unreservedly, with splendid emulation and with thought only how our Nation's great cause can be furthered, into such of the waiting tasks as they might be able to do best. Several chiefs of sections have themselves served in war work under chiefs of other sections. In the close teamwork between divisions the divisional boundaries have often been lost sight of. This is especially true of the joint work of the division of geology and mineral resources, between which the mutual cooperation of geologists in supplying information and assistance has been most complete. The same spirit and practicality of helpfulness have prevailed also in the divisions of Alaskan mineral resources and chemical and physical researches.

Although the more strictly scientific work of the geologic branch involving field examinations is practically suspended during the war, many scientific data relating to the problems under study are gathered as the strictly economic work proceeds. In fact, economic work of the highest order is not performed by geologists who do not keenly observe accessory and related criteria that appear at first to be purely scientific.

Some progress has been made in the thorough observation of temperatures in deep wells by new methods, more precise than those hitherto in use. Also a beginning has been made in a most profitable study of oil field waters and of the petrologic and chemical composition of the oil sands, with reference to changes in the water content and the results of underground evaporation by expanding gases.

It is to be regretted that the exigencies of war have made it necessary for the Coast and Geodetic Survey, which, in cooperation with the Geological Survey, was engaged in observations of gravity in different parts of the country, to suspend this work for a time, for it is expected that the results of these tests may prove to have very important applications to the solution of some economic problems, including the location of mineral deposits of certain types.

Another feature of the year that is to be regretted is the slow progress in the publication of Survey manuscripts submitted to the Public Printer. Even the economic reports most urgently needed by the public have, in general, been issued only after unusual delays.

The work of the division is more fully described in the following accounts of the geologic investigations of the Survey in the several States and Territories. It has extended to every State.

WORK OF THE DIVISION, BY STATES.

ALABAMA.

A report on the underground water resources in the vicinity of the proposed aviation camp at Tuscaloosa, Ala., by T. W. Vaughan, was submitted to the Signal Corps, United States Army, and the geographic features of the region including Camp McClellan, near Anniston, were examined and a popular description prepared for publication on the back of the topographic map of the vicinity by F. E. Matthes, who submitted geologic data as to the water supplies and building materials in the area. A geologic map of the Anniston quadrangle with cross section, prepared by Charles Butts, also was transmitted to the commanding officer of the camp.

Manganese deposits in Murphrees Valley, near Walnut Grove, were examined by G. W. Stose, and mica deposits in eastern Alabama were studied by W. T. Schaller.

A report on the commercial marbles of the southern Appalachian region, prepared in cooperation with the geological surveys of Tennessee, Alabama, and Georgia, has been completed by T. Nelson Dale, and a report on the correlation of the deposits of Jackson and Vicksburg age in Mississippi and Alabama, by C. Wythe Cooke, has been published outside the Survey.

ARIZONA.

A report on the geology and copper deposits of the Ray and Miami districts, Ariz., was completed by F. L. Ransome and has been submitted for publication as Professional Paper 115.

The tungsten and molybdenum deposits of the Hualpai Mountains, tungsten and manganese deposits near Globe, tungsten (scheelite) deposits in the Old Hat district, near Oracle, vanadium deposits near Dripping Springs, Christmas, and Winkelman, and molybdenum (wulfenite) deposits near Tucson and at Shultz (Mammoth district) were examined by F. L. Hess.

A brief paper on the recently discovered quicksilver deposits in the Phoenix Mountains has been submitted for publication in the "Contributions to economic geology, 1918" (Bulletin 690-D), by F. C. Schrader, who also completed a report, for the Office of Indian Affairs, on the geology and mineral deposits of the Gila River Indian Reservation.

Tungsten deposits in the vicinity of Nogales, Bisbee, Fort Huachuca, Dragoon, and Kingman and in the Hillside and Tip Top districts were examined by E. S. Larsen. Manganese deposits in the Patagonia and Ash Peak districts, in Mohave County near Williams and Santa Maria rivers, and at Tucson, Bouse, Wickenburg, Aguila, Winkelman, and Mammoth were examined by E. L. Jones, jr., and those at Bisbee and Tombstone by F. L. Ransome.

A report entitled "Geology of the Navajo country—a reconnaissance of parts of Arizona, New Mexico, and Utah," by H. E. Gregory, has been issued as Professional Paper 93.

Volcanic cinder cones near Ash Fork and Nevin, on the Santa Fe Railway, were examined by G. F. Loughlin in the search for vesicular lava suitable for an aggregate in concrete for ship construction.

ARKANSAS.

A report on the ground-water conditions of the site for the proposed aviation camp at Lonoke, Ark., by T. W. Vaughan, was submitted to the Signal Corps, United States Army, and a reconnaissance of the geology and physiography of the Little Rock quadrangle was made by L. W. Stephenson and H. D. Miser for use in a popular description to be printed on the back of the topographic map of the Little Rock quadrangle, which includes the Camp Pike military cantonment.

At the request of the Department of Justice, an investigation of the recent geologic history of certain "sunken lands" in northeastern Arkansas was made by E. W. Shaw. Mr. Shaw has in preparation a paper on lakes in northwestern Arkansas.

At the request of the United States Forest Service, the Arkansas National Forest, including portions of Garland, Saline, Perry, Yell, Montgomery, Polk, Pike, and Howard counties, and the Ozark National Forest, including portions of Johnson, Pope, Newton, Searcy, and Van Buren counties, were examined by A. C. Spencer, H. D. Miser, F. J. Katz, and Charles Butts, who reported on the erosional conditions and run-off.

The geology of the Batesville region was mapped and the manganese deposits were examined, with estimation of the ore reserves, by H. D. Miser. A report by Mr. Miser on the manganese deposits of the Caddo Gap and De Queen quadrangles has been issued as Bulletin 660–C.

The asphalt deposits and oil prospects in Pike and Sevier counties are discussed in a report by H. D. Miser and the late A. H. Purdue, published as Bulletin 691–J. They also contributed a paper on the gravel deposits of the Caddo Gap and De Queen quadrangles, printed as Bulletin 690–B.

The study of the Morrow fauna has occupied a portion of the office time of G. H. Girty.

A report, by G. H. Ashley, on greensand deposits, with special reference to their availability as a source of potash, was published in Bulletin 660–B.

CALIFORNIA.

The search for platinum in the serpentine region and the examination of the platiniferous deposits in northern California were continued by L. M. Prindle, who was for a time associated with H. G.

Ferguson. This work was conducted in cooperation with the State Mining Bureau. The areas examined included East Fork, Hay Fork, and Post Creek, in the southern part of Trinity County, and the South Fork of Trinity River.

Most of the developed chromite deposits in the State were visited by J. S. Diller in the summer of 1917 with a view to determining their size and their prospective output during the last half of 1917 and 1918. In June, 1918, field investigations were resumed in greater detail so as to include all the known or reported deposits in the State, the work being conducted under agreement by Prof. G. D. Louderback, of the State Council of Defense, and by Mr. Diller, in cooperation with the State Mining Bureau and the United States Bureau of Mines. This work, which is now in progress, includes the inventory of the available chromite resources, as well as the estimation of the prospective production of the mines. Under similar cooperative auspices the manganese deposits of the greater part of the State are now under examination, those in the eastern parts of San Bernardino, Riverside, and Imperial counties by E. L. Jones, jr.

The quicksilver deposits, both developed and undeveloped, were examined by F. L. Ransome, with special reference to their probable and possible production during 1918.

An investigation, with extensive sampling as a basis for commercial estimates of their value, of nitrate occurrences, with the necessary accessory study of the geologic structure, stratigraphy, and physiography, was carried out in several districts in the lower valley of Amargosa River, at the south end of Death Valley. The districts covered are the Saratoga Niter Hills, Confidence Hills, Owl Springs; the so-called Round Mountain and Valley beds; the Zabriskie basin including lake-bed deposits near Zabriskie, Shoshone, Tecopa, Resting Springs, and Tule Springs; and the so-called Upper Canyon and Lower Canyon beds, near Amargosa River south of Tecopa. The so-called Pilot niter field, at the south end of Slate Range, in Panamint Valley, was also examined. This work was done in cooperation with the Nitrates Division of the Ordnance Department of the War Department, under the general supervision of Hoyt S. Gale, by parties in charge of L. F. Noble, G. R. Mansfield, F. C. Calkins, and Theodore Chapin. Investigations will be continued by L. F. Noble with special reference to the origin of the caliche nitrates already examined and with a view to studying the possibility of the occurrence of nitrate in the bedded Tertiary deposits of the region.

A number of reported potash deposits, including those in the vicinity of Ash Meadows and in Deep Springs Valley, and the developments that have recently taken place about Owens Lake were examined by Mr. Gale.

Tungsten deposits near Victorville, Atolia, and Woody, in the Greenhorn Mountains, and at Grass Valley were examined by Frank L. Hess. Others near Bishop and Big Pine, in the south end of the Sierra Nevada, near Atolia, and in eastern San Bernardino County were studied by E. S. Larsen, jr. Mr. Larsen also examined molybdenum deposits in northern California, in Tulare County, and near the head of Death Valley and a celestite deposit west of Brawley, in Imperial County.

A detailed examination with mapping of the prospective oil territory of the Camulos quadrangle was made by W. S. W. Kew, assisted by J. P. Buwalda and C. M. Wagner. A report by Mr. Kew on the "Structure and oil resources of the Simi Valley" has been submitted for publication in "Contributions to economic geology, 1918" (Bulletin 691–M).

A report on the oil-field waters of the Sunset-Midway field has been prepared by G. S. Rogers to accompany a professional paper on the geology of that field submitted for publication by R. W. Pack. Available information regarding the geology of the Whittier-Fullerton oil field has been compiled by W. A. English in preparation for the detailed study of the region.

A report by W. A. English on the "Geology and oil prospects of the Salinas Valley-Parkfield area" has been printed as Bulletin 691–H. A brief discussion of the oil prospects in California has been submitted by W. B. Emery in a report on prospective oil fields in the public-land States.

A report on the strontianite deposits near Barstow, by Adolph Knopf, has been published as Bulletin 660–I, and a paper on "An andalusite mass in the pre-Cambrian of the Inyo Range" has been submitted by Mr. Knopf for unofficial publication.

The magnesite deposits of the State were examined by R. W. Stone, and his conclusions are contained in the report on magnesite in the current volume of Mineral Resources.

A report on "Hydraulic-mining débris in the Sierra Nevada," presenting the results of an exhaustive study, by the late G. K. Gilbert, of the detritus problems of the Sacramento basin and San Francisco Bay, was issued as Professional Paper 105.

Office work in the study of the Tertiary invertebrates of the coast formations and on a report on the Cretaceous invertebrates of the State was performed respectively by W. H. Dall and T. W. Stanton.

COLORADO.

The known or reported manganese deposits near Placerville, Salida, Wellsville, Moffatt, Iola, and Klondyke, Colo., were examined by E. L. Jones, jr., and those near Leadville and Red Cliff by J. B. Umpleby. The principal conclusions reached have been given to the press or contributed to technical journals. Molybdenum deposits in the Iron Springs district also were examined by Mr. Jones.

Some further study of the Boulder tungsten field was made by Frank L. Hess, who also made a hasty estimate of the quality of tailings from the Cripple Creek gold district. Some of these tailings contain a considerable percentage of potash combined with silica and alumina, and interest has been shown in the possibility of separating the potash. Later in the year Mr. Hess examined the large molybdenite deposits at Climax, Summit County.

In continuance of the oil-shale investigations in this State, a reconnaissance examination with mapping of 22 townships northwest of De Beque was completed by D. E. Winchester, who in June revisited the region for the purpose of noting the mining operations and procuring samples of less weathered material for testing. The mapping of the oil shales in the region north of the Grand River valley in the De Beque district is completed, and the report is now in preparation.

Coal lands near Mount Harris, Routt County, were examined to procure data for classification by Mr. Winchester, and lands south of Mancos, in Montezuma County, by A. J. Collier. A short report on the Mancos area has been submitted by Mr. Collier for publication in "Contributions to economic geology, 1918" (Bulletin 691–K).

Some examinations and compilation of office data relating to the structural features favorable to oil and gas in the Axial and Monument Butte quadrangles were made by E. T. Hancock for purposes of classification, and inspections of structure and the results of drilling at several points north of Denver were made by W. T. Lee. The broad structural features of eastern Colorado are described, with reference to their possibilities of containing oil, in a paper by N. H. Darton, published as Bulletin 691–A. A paper on the "Geology and paleontology of the Raton Mesa and other regions in Colorado and New Mexico," by W. T. Lee and F. H. Knowlton, has been issued as Professional Paper 101.

The monograph on the Leadville district, long in preparation, was so nearly completed as to be submitted by the late Capt. J. D. Irving on his departure for France. A chapter on the oxidized zinc ores, written by G. F. Loughlin for inclusion in this monograph, is being published in advance as Bulletin 681.

In the office the description of the flora of the Denver formation, by F. H. Knowlton, has gone forward, and the Cretaceous invertebrates have received some attention by T. W. Stanton. A description of the Zion Canyon National Monument was prepared by W. T. Lee for publication by the National Park Service.

Some progress was made in the compilation of the materials for the San Juan report by Whitman Cross and E. S. Larsen, prior to the detachment of both geologists on investigations of war minerals. A report on the "Geology and ore deposits of the Creede district," by W. H. Emmons and E. S. Larsen, was submitted for publication in "Contributions to economic geology," and a paper on the "Geology of the Creede mining district" has been prepared by Mr. Larsen for unofficial publication.

CONNECTICUT.

In order to facilitate the completion of the geologic mapping in progress in cooperation with the Connecticut Geological and Natural History Survey, under the direction of H. E. Gregory, a conference was held with Prof. Gregory by W. C. Alden with reference to the Pleistocene deposits of the Granby, Hartford, Meriden, Middletown, New Haven, Guilford, and Saybrook quadrangles, which have been under examination for folio publication. The geographic features of the State are to be treated by Arthur Keith in a handbook on the geography of New England.

The large quartz deposit at Lantern Hill, North Stonington, was examined by G. F. Loughlin in cooperation with the Carnegie Geophysical Laboratory to determine its suitability for the manufacture of optical glass.

An economic study of the limestone and dolomites of western Connecticut and Massachusetts has been begun by T. Nelson Dale. Manuscript of a bulletin on the granites of New England, bringing up to date in one volume the information heretofore distributed among several bulletins, has been practically completed by Mr. Dale.

DELAWARE.

A description of the geographic features of Delaware was written by L. W. Stephenson as a part of a geographic handbook to cover the States of Delaware, Maryland, Virginia, and West Virginia.

The results of sampling and tests of the marls for potash are given in a paper entitled "Notes on the greensand deposits of the Eastern United States," by G. H. Ashley, published as Bulletin 660-B.

FLORIDA.

At the request of the construction quartermaster of the gunnery station to be established south of Miami, Fla., an oral report was made by T. W. Vaughan on the ground-water conditions in the vicinity of Miami.

The rutile-bearing sand on the coast near Pablo Beach was examined by F. L. Hess in cooperation with the Bureau of Mines. A conference on the deposits was held with E. H. Sellards, State geologist.

After informally contributing to the State geologist the principal results of the structural investigations relating to oil and gas in the region between Marianna and Lake City and between Lake City and Tampa and in the vicinities of Kissimmee, Melbourne, and Titusville, made in June and July in cooperation with the State Geological Survey, O. B. Hopkins spent some time in the office preparation of a report thereon, until the pressure for field examinations in the Mid-Continent field and Texas necessitated his detail to those regions.

Office work on the description of the Mollusca from the Alum Bluff formation was continued during part of the year by Julia Gardner, until her departure for France, and the study of the fauna of the Nashua marl was advanced by W. C. Mansfield, who for most of the year assisted in the compilation of the statistics of production and distribution of coal and in the field mapping of military geologic features. A report on the Foraminifera of the genus *Orthophragmina*, by J. A. Cushman and C. Wythe Cooke, has been issued as Professional Paper 108–G.

A description of the physiographic features of the Interlachen quadrangle was written by T. W. Vaughan.

GEORGIA.

A preliminary examination of the manganese deposits in the vicinity of Cartersville, Ga., was made in August by F. C. Schrader, but the detailed mapping and examination of the entire Cartersville region was undertaken in June by Laurence LaForge, and the investigation of the mineral prospects was undertaken by representatives of the State Geological Survey, with which this work (not yet completed) is done in cooperation. Deposits of high-grade mica in northern Georgia were examined by W. T. Schaller.

A report on the commercial marbles of the southern Appalachian region, prepared in cooperation with the geological surveys of Alabama, Georgia, and Tennessee, by T. Nelson Dale, has been completed.

A report on the ground-water conditions in the vicinity of Grayson and the water supply for an aviation camp site at Americus, by T. W. Vaughan, was made to the Signal Corps, United States Army, and information on the water supply for a chemical plant at Brunswick was furnished by L. W. Stephenson. The general geographic and geologic features of the country including Camp Gordon were reviewed by F. E. Matthes for popular description on the back of the topographic map of the camp and environment, in cooperation with the State.

Preparation of a report on the geologic structure in the Fitzgerald district and along Chattahoochee River in southern Georgia, examined at the request of the State Geological Survey, was, after communication of the principal conclusions to the press, suspended for the remainder of the year on account of the imperative necessity for field examinations in other more promising regions.

A report on "Deposits of Claiborne and Jackson age in Georgia," by C. Wythe Cooke and H. K. Shearer, has been published as Professional Paper 120–C, and a report by J. A. Cushman and Mr. Cooke on the "Orbitoid Foraminifera of the genus *Orthophragmina* from Georgia and Florida" as Professional Paper 108–G. Some progress in the office description of the fossils from the Alum Bluff formation in the State was made by Julia Gardner prior to her departure to France with the Red Cross.

IDAHO.

A portion of July was spent by J. B. Umpleby in the compilation of material in preparation of the report by him and E. L. Jones, jr., on the ore deposits of Idaho.

G. R. Mansfield has been engaged in the investigation and classification of lands in several of the coal basins of eastern Idaho where applicants desired to open coal mines.

The manuscript describing the Hailey quadrangle by L. G. Westgate is practically completed. A stratigraphic chapter for this report was completed by E. S. Kirk, and collections of fossil invertebrates and plants have been examined for information of the field geologists by T. W. Stanton and F. H. Knowlton. Some office attention has been given by G. H. Girty to the invertebrates from the Lower Triassic of the State.

Deposits of cobalt and nickel in the Blackbird district were examined by F. L. Hess, and tungsten deposits near Carroll were examined by E. S. Larsen, jr.

ILLINOIS.

Conforming to the plans of the Illinois State Geological Survey, which bore the field expenditures of the cooperative investigations, the study of the stratigraphy and economic geology of the Equality and Shawneetown quadrangles, in which the structure is complicated by much faulting, was continued by Charles Butts. The faunas of some of the Mississippi formations were reviewed in the office by G. H. Girty. Early Silurian invertebrates of southern Illinois and southeastern Missouri were examined by E. O. Ulrich in connection with work carried on in cooperation with the State of Missouri.

With the object of gathering information as to the possibilities of increasing the production of petroleum in the State, brief examinations of the Illinois oil fields were made by the geologists of the State in cooperation with this Survey, in the course of which E. W. Shaw visited some of the areas. A paper on "A new area of Carboniferous rocks with some coal in the north end of the Gulf embayment" was transmitted by Mr. Shaw for outside publication. A cooperative report by Stuart Weller and Charles Butts on the geology of Hardin County is now in preparation.

The geographic and more interesting geologic features in the region about Camp Grant have been reviewed and described in popular form by R. D. Salisbury for publication on the back of the Camp Grant topographic map. This work is contributed through the cooperation of the State.

INDIANA.

A report on the ground-water conditions of the site for the proposed aviation camp at Evansville, Ind., was made by T. Wayland Vaughan, and a brief inspection of the oil fields of the State was made by E. W. Shaw, with particular respect to the extension of the amount of undrilled "inside" territory. Conforming with the request of the Treasury Department and the Indiana Limestone Quarrymen's Association, work for a report on the character and grading of the Bedford limestone has been undertaken by G. F. Loughlin but has been suspended because of the war.

IOWA.

The geographic and geologic features in the vicinity of Camp Dodge, Iowa, were examined by James H. Lees, assistant State geologist, representing the cooperating State Survey, for a popular description of the country about the camp, by Mr. Lees and W. C. Alden, to be printed on the back of the Camp Dodge topographic map.

A report on "Evidence of Iowan stage of glaciation," by W. C. Alden, based on investigations conducted in cooperation with the State Geological Survey, has been published by the State.

For the purpose of establishing correlations essential to the completion of the reports on southwestern Minnesota, in accordance with the cooperative arrangement with the State Geological Survey, a reexamination of the drift in a portion of northwestern Iowa was made in October by Frank Leverett in conference with Profs. T. C. and R. T. Chamberlin.

KANSAS.

At the request of the Kansas State geologist a detailed cooperative examination was made by A. E. Fath of the Eldorado field and surrounding country, embracing a large part of Butler County, the work including reconnaissance inspections in the Augusta, Fox-Bush, and Weaver oil fields. The Otto field, in Cowley County, was examined by Mr. Fath at the request of the Bureau of Mines, to which a report thereon was immediately transmitted. A brief visit to the region embracing Eldorado was made by the chief geologist.

Some data on the possibilities of developing oil and gas in western Kansas are contained in a paper by N. H. Darton on "The structure of parts on the central Great Plains," printed as Bulletin 691-A.

KENTUCKY.

A popular description, educational in scope and purpose, of the region about Camp Taylor, Ky., embracing Louisville, was prepared by Charles Butts for publication on the back of the Camp Taylor topographic map.

A paper on the description and correlation of the post-Mississippian formations of western Kentucky by Charles Butts, based on studies made in cooperation at the request of the State Geological Survey, was transmitted to that organization for publication. This paper was accompanied by a paper on the stratigraphy of the Chester group by E. O. Ulrich.

An outline of the petroleum geology of Kentucky was prepared by E. W. Shaw, and some office work on the Carboniferous faunas concerned in the interstate cooperative investigations was done by G. H. Girty.

A description of the geologic structure and oil and gas prospects in the region of Irvine, by Mr. Shaw, has been issued as Bulletin 661-D. A report by Mr. Shaw and K. F. Mather on the "Oil fields of Allen County, Ky.," is in press as Bulletin 688.

The cannel coals of the State are described by G. H. Ashley in Bulletin 659, on "Cannel coal in the United States."

LOUISIANA.

At the request of the city of New Orleans an examination of the structural criteria and of the records of drilling in Terrebonne Parish, La., was made by E. W. Shaw, who submitted a brief preliminary report to the city commissioner of public utilities. Fossils from one of the gas wells in Terrebonne Parish were examined by C. Wythe Cooke, who determined that rocks of Tertiary age were upfolded in the region. Pleistocene invertebrates collected by the field geologists were examined by W. H. Dall.

Certain oil lands near Sour Lake, whose title is in dispute, were at the request of the Department of Justice reviewed by Frank Leverett with reference to their recent geologic history. The results of the work were immediately reported to that department.

The salt and oil domes in the new Iberia field were examined by G. S. Rogers in the course of an extended study of the salt domes of the Coastal Plain.

A description with maps of the De Soto-Red River oil and gas field, by G. C. Matson and O. B. Hopkins, is published as Bulletin 661-C, and a report by Mr. Matson on Louisiana clays, including the results of tests made in the laboratory of the Bureau of Standards at Pittsburgh, as Bulletin 660-E.

MAINE.

Pyrite deposits in the vicinity of Katahdin Iron Works and at other points in Maine were examined by E. S. Bastin and A. C. Spencer in connection with a review of the raw materials available for producing sulphuric acid in the United States.

The necessary field examinations were made and the greater part of the text for a descriptive report on the geographic features of the State was prepared by Arthur Keith for use in a geographic manual of the New England States.

A report on the "Stratigraphy in southwestern Maine and southeastern New Hampshire," by F. J. Katz, has been issued as Professional Paper 108–I.

A bulletin on the granites of New England, bringing up to date in one volume the information heretofore distributed among several bulletins, has been practically completed by T. Nelson Dale.

MARYLAND.

A description of the geographic and more interesting geologic features in the region embracing Camp Meade, Md., is, through the cordial cooperation of the Maryland Geological Survey, being prepared by E. W. Berry, for printing on the back of the topographic map of the area.

The chromite deposits in and about the Line Pit mine, in Cecil County, were examined by Miss E. F. Bliss.

A report on the potable water supply in the lower part of the Patuxent estuary was prepared for use of the Navy Department by the section of Coastal Plain investigations in cooperation with the State Geological Survey.

The greensand deposits are described by G. H. Ashley, with special reference to their availability as a source of potash, in Bulletin 660–B.

Descriptions of the physical features of the Coastal Plain and of the Allegheny regions of the State have been prepared by L. W. Stephenson and M. R. Campbell, respectively, and examinations of the Piedmont Plateau and the valley region have been made by Laurence LaForge and G. W. Stose, to obtain material for use in the preparation of a geographic manual covering the States of Maryland, Delaware, West Virginia, and Virginia.

MASSACHUSETTS.

Information regarding the road materials of Massachusetts has been compiled by Laurence LaForge and B. K. Emerson for use of the Council of National Defense.

Descriptions of granites in Massachusetts are included in an economic bulletin on the granites of New England, the manuscript of which has been practically completed by T. Nelson Dale; and an economic study of the limestones and dolomites of western Massachusetts and Connecticut has been begun by Mr. Dale.

A preliminary report by B. K. Emerson on the "Geology of Massachusetts and Rhode Island" has been issued as Bulletin 597.

Tertiary invertebrates collected in connection with the Coastal Plain investigations were examined by W. H. Dall.

The physical features of the State are described by Arthur Keith in a manual on the geography of New England, now in preparation.

MICHIGAN.

In connection with the preparation of his report on the Pleistocene of the Lake Superior region Frank Leverett examined the drift in the Elsie and Perrinton quadrangles, Mich. The results of this study were used also for Mr. Leverett's report on the Pleistocene deposits of Minnesota, investigated in cooperation with the Minnesota Geological Survey.

A report on the geography and geology of the country including Camp Custer, near Battle Creek, was prepared by Mr. Leverett in cooperation with the State Geological Survey for publication by the State. A shorter and more popular educational description of the area was written by Mr. Leverett for printing on the back of the topographic map of the region.

The description of the fauna of the Marshall group has received some office attention from G. H. Girty.

MINNESOTA.

A preliminary report on the Cuyuna iron-ore district, Minn., was prepared by E. C. Harder and submitted for publication by the Minnesota Geological Survey, with which the work was done in cooperation. A paper on the manganiferous iron ores of the Cuyuna district, prepared by Mr. Harder, was published in the Bulletin of the American Institute of Mining Engineers for September, 1917. Mr. Harder also made some progress in the preparation of his final report on the Cuyuna district.

The description of the Pleistocene deposits of Minnesota, based on field investigations carried on in cooperation with the State Geological Survey, was nearly completed by Frank Leverett. Office study based on cooperative field investigations was carried on by Frank Leverett in the preparation of his report on the "Surface formations and agricultural conditions of southern Minnesota." This report is designed for publication by the State.

"Structural and ornamental stones of Minnesota," a report by Oliver Bowles, based on cooperative work by the State Geological Survey, has been published as Bulletin 663.

MISSISSIPPI.

A report on the ground-water conditions in the vicinity of Jackson, Miss., by T. Wayland Vaughan, was submitted to the Signal Corps. A manuscript on the ground-water resources of the Cretaceous deposits of the State, based on investigations carried on in cooperation with the State Geological Survey, is in preparation by L. W. Stephenson. The water supply for an aviation camp site at West Point was the subject of a report by Mr. Stephenson, and the ground-water prospects in the vicinity of Camp Shelby were examined by Mr. Stephenson for the War Department.

A paper on the correlation of the deposits of Jackson and Vicksburg age in Mississippi and Alabama, by C. Wythe Cooke, has been published outside the Survey, and a report entitled "Deposits of Claiborne and Jackson age in Georgia," by Mr. Cooke and H. K. Shearer, has been issued as Professional Paper 120–C. .

A report on the "Pliocene history of central and northern Mississippi," by E. W. Shaw, has been published as Professional Paper 108–H.

MISSOURI.

The faunas of southeastern Missouri received both field and office attention from E. O. Ulrich, through the cooperation of the State Bureau of Mines and Economic Geology, which bore the cost of the field investigations.

A portion of the year was devoted by G. H. Girty to the study of the fossil invertebrates of the Joplin district.

MONTANA.

The manganese ore deposits in the vicinity of Butte and in the Madison and Jefferson valleys, Mont., were examined by J. T. Pardee, and those in the Philipsburg district by J. B. Umpleby, with a view to ascertaining the capacity of the region to contribute to the domestic supply of manganese in 1917 and 1918. A paper on "Manganese ore at Butte," by Mr. Pardee, has been issued as Bulletin 690–E, and reports on "Ore deposits of the northwestern part of the Garnet Range, Mont.," and on "The Dunkleberg district, Granite County, Mont.," by Mr. Pardee, have been published in Bulletin 660, parts F and G, respectively.

Tungsten (scheelite) deposits in the Crevice and Sheepeater districts near Jardine, hübnerite deposits near Butte, and molybdenite deposits near Butte and in the Tobacco Root Mountains, 23 miles south of Jefferson Island, were examined by Frank L. Hess.

The structure and oil and gas possibilities of the Huntley field, an area lying north of the Crow Indian Reservation and southeast of

Billings, were examined by E. T. Hancock and a report with map recording the results has been submitted for publication in the "Contributions to economic geology."

Portions of Teton County were examined in reconnaissance or in detail by Eugene Stebinger, with special reference to oil and gas. A paper on the "Geology of the Birch Creek-Sun River region, Mont.," has been submitted by Mr. Stebinger and is now in press as Bulletin 691–E.

A report by C. F. Bowen on "Anticlines in parts of the Musselshell Valley" is in press as Bulletin 691–F, and another on the "Geology and oil and gas prospects of the Lake Basin field," west of Billings, by E. T. Hancock, has been issued as Bulletin 691–D. A description of the Elk Basin oil field, by C. J. Hares, has been prepared for publication. Papers entitled "The Bowdoin dome, Montana, a possible reservoir of oil and gas," by A. J. Collier, and "Phosphatic oil shales near Dell and Dillon, Beaverhead County, Mont.," by C. F. Bowen, were published as parts E and I, respectively, of Bulletin 661.

The graphite deposits at Dillon were examined by H. G. Ferguson, and the Devonian oil shales near Freeport were sampled by E. T. Hancock for distillation tests.

A report on the coal fields of Montana, by A. J. Collier and E. R. Lloyd, has been somewhat advanced by Mr. Collier, who has also in preparation a report on the Scobey lignite field. Mr. Collier's paper on the geology of northeastern Montana (Professional Paper 120–B) is in press.

Cretaceous invertebrates from the State have been under descriptive investigation by T. W. Stanton and fossil plants by F. H. Knowlton. A report by D. Dale Condit on the "Relations of the late Paleozoic and early Mesozoic formations of southwestern Montana and adjacent parts of Wyoming" has been submitted for publication in the "Shorter contributions to general geology, 1918" (Professional Paper 120–F).

A preliminary report on the Pleistocene of northeastern Montana and northwestern North Dakota, in preparation by W. C. Alden, was early in the year interrupted for more urgent work connected with war interests. A paper by A. J. Collier and W. T. Thom, jr., on "The Flaxville gravel and its relation to other terrace gravels of the northern Great Plains," has been issued as Professional Paper 108–J. The classification of the coal lands in the northeastern part of the Crow Indian Reservation was completed by A. J. Collier, assisted by Chester K. Wentworth. The report on "The Bull Mountain coal field, Musselshell and Yellowstone counties, Mont.," by L. H. Woolsey, R. W. Richards, and C. T. Lupton, has been issued as Bulletin 647.

NEBRASKA.

Several of the alkali lakes and the potash-recovery plants in western Nebraska were briefly examined by H. S. Gale.

The oil prospects in the western part of the State are tentatively discussed by N. H. Darton in "The structure of parts of the central Great Plains," published as Bulletin 691–A.

Tertiary and Pleistocene invertebrates from the State were examined by W. H. Dall.

NEVADA.

The quicksilver deposits at Ivanhoe Springs, in the Ione district, and at a number of other localities in Nevada, were examined by F. L. Ransome as a part of a quantitative and qualitative estimation of the quicksilver resources of the United States.

Manganese ore deposits near Pioche were examined in the autumn of 1917 by J. B. Umpleby, and the results were published both officially and unofficially. In the spring of 1918 J. T. Pardee examined the manganese ore deposits of White Pine County, including the Ely and Siegel districts, and the results of his work have been published in a press bulletin. A thorough inventory of the manganese deposits, either known or reported, in the State was begun in June, 1918, by E. L. Jones, jr., and J. C. Jones, in cooperation with the Bureau of Mines and the State University.

The sulphur, alum, and alunite deposits near the town of Sulphur were examined by E. S. Larsen, jr., who submitted notes with special reference to the possible availability of the alunite deposit as a source of potash. A brief examination of the reported deposit of potash discovered north of Lovelocks was made by F. L. Hess.

Tungsten deposits were examined by Mr. Hess and Mr. Larsen, either together or separately, at or near Tungstonia, Golconda, Ellsworth, Imlay, Mill City, Shoshone (Minerva district), Baker (Snake Creek, South Lexington Canyon), Osceola, Sacramento Pass, and numerous localities reached from Lovelocks, at Toulon, Toy, Round Mountain, and Spanish Springs, in the "Lava Beds" west of Seven Troughs, and in the Nightingale Mountains. Most of these are contact-metamorphic deposits now making a considerable aggregate production. Mr. Larsen examined a molybdenite deposit north of Golconda. The deposits were examined with the object of determining the amounts and grades of ore obtainable for use under war conditions.

A report on "The antimonial silver-lead veins of the Arabia district, Nev.," by Adolph Knopf, was published as Bulletin 660–H. Another report by Mr. Knopf on the geology and ore deposits of the Rochester district, in preparation, has been suspended for more urgent investigations.

A report on "The geology and ore deposits of Ely, Nev.," by A. C. Spencer, has been printed as Professional Paper 96, and a report on the genesis of the Tonopah ores, by E. S. Bastin and F. B. Laney, is now in press as Professional Paper 104.

NEW HAMPSHIRE.

The surficial features of New Hampshire are described by Arthur Keith in the geographic manual on New England, now nearing completion.

A report by F. J. Katz on "Stratigraphy in southwestern Maine and southeastern New Hampshire" has been published as Professional Paper 108–I.

Descriptions of New Hampshire granites are included in an economic bulletin on the granites of New England by T. Nelson Dale, the manuscript of which is practically completed.

NEW JERSEY.

The geographic and salient geologic features in the vicinity of Camp Dix, near Wrightstown, N. J., were examined in cooperation by H. B. Kümmel, State geologist, and E. W. Shaw, with the object of jointly preparing a popular description of the region to be printed on the back of the topographic map of the camp.

The composition of the greensands of the southern part of the State and their availability as a source of potash are set forth in a paper by G. H. Ashley, printed as Bulletin 660–B.

NEW MEXICO.

The examination of the "Red Beds" and the gypsum and saline deposits of New Mexico, with the object of determining the geologic history of the region and the horizons at which potash may be present, was continued by N. H. Darton, who is engaged in the preparation of a report on the stratigraphy and structure of the "Red Beds" region of the Southwest with special reference to the possibilities of the presence of potash. A brief investigation of the reported discovery of potash deposits near Tucumcari was made by R. K. Bailey, and an examination of springs reported to contain notable proportions of potash coming from the "Red Beds" near Grant was made by Mr. Darton.

Sulphur deposits in the vicinity of Jemez Springs were examined and reported on by G. R. Mansfield.

The classification of the lands in the northeastern portion of the San Juan Basin, with reference to oil and coal, was continued by J. B. Reeside, jr., and Harvey Bassler. After Mr. Reeside's entrance on military duty Mr. Bassler continued the work until the end of the field season.

Manganese deposits near Silver City were examined by J. B. Umpleby, and those near Magdalena, Fierro, Rincon, Hillsboro, and Lake Valley by E. L. Jones, jr. Tungsten deposits at White Oaks, near Rinconada (Copper Mountain or Picuris district), and near Gage, and iron deposits near White Oaks were examined by F. L. Hess.

Several volcanic cinder cones were examined by G. F. Loughlin, assisted by C. E. Barglebaugh and H. D. Pallister, for the Emergency Fleet Corporation, in search of porous rock suitable for a lightweight aggregate in concrete for ship construction.

"The geology of the Navajo country—a reconnaissance of parts of Arizona, New Mexico, and Utah," by H. E. Gregory, has been issued as Professional Paper 93.

The Cretaceous invertebrates from several parts of the State received office attention from T. W. Stanton. Papers on the "Geology and paleontology of the Raton Mesa and other regions in Colorado and New Mexico," by W. T. Lee and F. H. Knowlton, are printed in Professional Paper 101. The text and maps for the Raton-Brilliant folio have been submitted by Mr. Lee.

Some progress was made by Sidney Paige in the report on the Tyrone district, and the geology of the Deming quadrangle is mapped and described in detail by Mr. Darton in Folio 207.

NEW YORK.

The physiographic features of the areas embracing Camp Upton and Camp Mills, N. Y., were examined by W. C. Alden, who prepared popular educational descriptions of the geographic features and their origin for printing on the backs of the topographic maps covering these areas. Geologic data of military value for Long Island were compiled and mapped by Mr. Alden.

Manganese deposits at Annandale were examined by D. F. Hewett. Some office time was given by E. O. Ulrich to the study of the fossils from the Chazy formations in the northern part of the State.

NORTH CAROLINA.

Manganese deposits in the Hot Springs region, N. C., were examined by F. C. Schrader. At the request of the State Geological Survey, the limestones and marls of the Coastal Plain were studied in the field by J. A. Cushman and E. W. Berry, with sampling for analyses and economic tests. A report by Mr. Cushman and Mr. Berry is now in preparation for publication by the State, with which the work was done in cooperation. Fossils collected by Mr. Cushman were identified by C. W. Cooke.

A paper on the tin deposits of the Kings Mountain region, by Arthur Keith and D. B. Sterrett, has been published as Bulletin

660–D, and a report, by G. H. Ashley, on greensand deposits in the State, with special reference to their availability as a source of potash, was published in Bulletin 660–B. Mica deposits in the Piedmont region were examined by W. T. Schaller.

Descriptions of the marbles of North Carolina are included in a report on the commercial marbles of the southern Appalachian region, which has been completed by T. Nelson Dale.

A number of clay-bearing localities in the State were examined by Heinrich Ries, in connection with the preparation of a general report by him on the high-grade clays of the United States which may be used in substitution for imported clays.

Information on a proposed artillery cantonment was contributed to the Chief of Field Artillery by T. W. Vaughan, who made field examinations with Lieut. Col. E. P. King, jr., particularly between Fayetteville and Hamlet.

NORTH DAKOTA.

In cooperation with the North Dakota Geological Survey the lignite-bearing areas of the Ray quadrangle were examined and the lands classified by A. J. Collier, assisted by C. G. Wentworth. The Nesson anticline, which offers possibilities of oil in a part of Williams County, has been described by Mr. Collier in a short report now being printed as Bulletin 691–G.

The fossil shells collected by the field geologists in the Lance formation and the plants from the Eocene have been examined by T. W. Stanton and F. H. Knowlton, respectively, for the purpose of assisting in the correlation of the geologic formations.

The manuscript for a folio by H. A. Hard on the Edgeley and Lamoure quadrangles was critically reviewed by W. C. Alden.

OHIO.

The geographic and geologic features of the vicinity of Camp Sherman, near Chillicothe, Ohio, were examined by M. R. Campbell and Frank Leverett, the information being for the use of the State geologist, Prof. J. A. Bownocker, and Mr. Campbell, respectively, in the preparation of popular descriptions of the physical features of the region and their origin. The material compiled by Mr. Campbell has been published in the form of a popular educational text on the back of the topographic map of Camp Sherman.

A special report on the oil and gas resources of the Woodsfield quadrangle, in preparation by D. D. Condit and R. V. A. Mills, will deal particularly with the lack of parallelism between the Berea sand and the exposed Pennsylvanian formations and the relatively close adherence of the Berea oil pools to the domes and anticlines actually in the Berea itself. This work has been delayed by the transfer of

Mr. Mills to the Bureau of Mines and the detail of Mr. Condit to more urgent war work.

A summary report with maps on "The coal fields of Ohio," prepared through the cooperation of the State Geological Survey by J. A. Bownocker, State geologist, has been issued as Professional Paper 100–B.

Manuscripts on the clay and the oil resources of the Wellsville quadrangle have been prepared by James H. Hance.

OKLAHOMA.

In view of the prospective leasing for oil of the lands in the Osage Reservation, Okla., and the great importance of this territory by reason of the general productivity of its numerous anticlines and domes, the high grade of the oil, and the availability of refining and transportation facilities, as many as practicable of the oil and gas geologists were assigned to studies of the structure in Osage County. Thirteen townships in the west half of the county have been examined by C. F. Bowen, assisted by G. E. Dorsey; on the "east side" the work begun by K. C. Heald two years ago was continued throughout the year, during which he was joined by F. R. Clark, D. E. Winchester, W. B. Emery, E. R. Lloyd, R. V. A. Mills, W. S. W. Kew, E. M. Spieker, K. F. Mather, G. B. Richardson, O. B. Hopkins, Sidney Powers, W. A. English, J. P. Buwalda, H. M. Robinson, M. I. Goldman, C. S. Ross, and P. V. Roundy. The field investigations of the Pawhuska quadrangle were completed in June, and work was begun on the preparation of a series of papers describing and mapping the geologic structure by townships, the papers to be issued as rapidly as possible for the guidance of prospective lessees of these lands, which are being placed upon the market in large aggregate acreages. These papers will form parts of Bulletin 686. The description and map of several townships in the northwest quarter of the Pawhuska quadrangle, by Mr. Heald, have been issued as Bulletin 691–C.

Press notices bringing to the attention of the public certain anticlines and domes in Pontotoc and Hughes counties have been based on the work done by H. M. Robinson in cooperation with the Office of Indian Affairs and the Superintendent of the Five Civilized Tribes. Further examinations in southern Oklahoma were made by Mr. Robinson in June. This work included the additional study of the Preston anticline, in the Denison and Tishomingo quadrangles, on which Mr. Hopkins and Mr. Powers had been engaged earlier in the winter. This anticline is described, with small-scale map, in a general report on the stratigraphy, structure, and areal geology of parts of northern Texas and southern Oklahoma, based on field examinations made by Messrs. Stephenson, Hopkins, and Powers, which is now in process of publication as Professional Paper 120–H.

Detailed structural examinations in a part of the west half of the Hominy quadrangle were made under agreement by Robert H. Wood, whose work was, however, interrupted by other demands.

At the request of the Commanding Officer of the Department of the Southwest, an examination of the structure and oil and gas possibilities of the Fort Sill military reservation was begun. While the geologist, Sidney Powers, was engaged in this examination in June, he was called into military service, leaving the work unfinished.

To bring up to date the information regarding the progress of developments in the south half of the Bristow quadrangle, A. E. Fath reviewed that area in May. Several collections of Carboniferous fossils, sent into the office by field geologists, were examined by G. H. Girty.

A report on "Geologic structure in the Cushing oil and gas field, Okla., and its relation to the oil, gas, and water," by Carl H. Beal, courteously contributed in cooperation by the Bureau of Mines, has been published as Bulletin 658.

The manganese and iron ore deposits near Bromide and Sulphur were examined in October by D. F. Hewett in company with representatives of the Oklahoma Geological Survey.

OREGON.

The deposits of antimony, molybdenum, and tungsten in the vicinity of Baker City, La Grande, Huntington, Weatherby, North Powder, St. Joseph, and Lostine, Oreg., were examined by E. S. Larsen, jr., who also examined deposits of the rare minerals in other areas.

In the course of the Survey's investigations of the platinum resources of the country, the platinum-bearing placers and the serpentine regions of Oregon were studied by L. M. Prindle and H. G. Ferguson. Manganese deposits near Pleasant Valley were investigated by J. T. Pardee.

A number of chromite localities of southwestern and eastern Oregon were visited by J. S. Diller in connection with the estimation of the possible chromite output for 1917 and 1918.

Certain of the quicksilver deposits of the State were investigated by F. L. Ransome in November.

Collections of Cretaceous and Carboniferous fossils gathered by the field geologists were determined in the office by T. W. Stanton and G. H. Girty, respectively.

The nitrate claims prospected near Vale and the several reported deposits in the vicinity of Bend were examined by H. S. Gale, who also inspected several locations in Yamhill County and vicinity, where small amounts of natural gas have been developed. The exploration near Vale was the basis of an article on the origin of nitrates contributed by Mr. Gale to the Mining and Scientific Press for November 13, 1917.

PENNSYLVANIA.

The field investigation of the areal and structural geology of the Zelienople quadrangle, Pa., was finished early in the season by G. B. Richardson, who also completed the mapping, with special reference to the structure and gas resources, of the southern half of the New Kensington quadrangle, before the pressure for examinations in the Osage Reservation, Okla., called Mr. Richardson to that region.

A geologic section of Blair and Huntingdon counties, accompanied by a descriptive text, was prepared and published by Charles Butts in the June issue of the American Journal of Science.

The abandoned chromite mines and the chromite-bearing serpentines of southeastern Pennsylvania have been examined by Miss E. F. Bliss. The results of this study have been contributed to the press and in more detailed form to the different interested Governmental war-mineral agencies.

The text and maps for the Bellefonte folio have been submitted to the Survey by Prof. E. S. Moore, the work having been done under an agreement of a previous year. The Huntingdon-Hollidaysburg folio has been submitted by Charles Butts to the chief of section.

A paper on "The Helderberg limestone of central Pennsylvania," by J. B. Reeside, jr., is printed as Professional Paper 108-K. The cannel coals of the State are described, with analyses, by G. H. Ashley, in Bulletin 659.

RHODE ISLAND.

The results of a reconnaissance survey of the general geology of Rhode Island, by B. K. Emerson, are given with a map in Bulletin 597, "Geology of Massachusetts and Rhode Island." The physical features of the State are described in a manual on the geography of New England, now in preparation by Arthur Keith.

Descriptions of Rhode Island granites are included in an economic bulletin on the granites of New England, manuscript of which has been practically completed by T. Nelson Dale.

SOUTH CAROLINA.

The counties included in the Coastal Plain in South Carolina were examined with special reference to the mapping and description of geologic data of military importance and interest by C. Wythe Cooke, who during the last half of the year contributed reports on the military geology and geography of a number of the counties for transmission to the engineers of the War Department. The reconnaissance was made with mapping on the scale of 1: 500,000.

At the request of the War Department a report on the possibilities of obtaining a water supply from wells at Fort Moultrie was prepared by members of the Coastal Plain section for transmission to the War Department, and a report on the water resources of Camp Jackson was prepared by Mr. Cooke for the engineer officer in charge.

The tin deposits of the State are described in a report by Arthur Keith and D. B. Sterrett, on "Tin resources of the Kings Mountain district, North Carolina and South Carolina," printed as Bulletin 660-D. Mica deposits in the western part of the State were examined by W. T. Schaller.

SOUTH DAKOTA.

The general structural features and the oil and gas possibilities of the southwestern part of South Dakota are discussed by N. H. Darton in a report on "The structure of parts of the central Great Plains," printed as Bulletin 691-A.

TENNESSEE.

In accordance with a cooperative agreement with the Tennessee Geological Survey, a detailed examination of the physiography and structure of the manganese ore-bearing areas of eastern Tennessee was begun by G. W. Stose and F. C. Schrader, the general geology being in the hands of Mr. Stose and the investigation, with qualitative and quantitative estimation, of the manganese ores being carried on by Mr. Schrader. A progress report on the area now covered is now ready for submission to the State Survey for publication. A small area near Sevierville containing carbonates of manganese was examined by Arthur Keith and G. W. Stose in March.

Manganese deposits in the Del Rio district were examined and sampled by F. C. Schrader in August.

A report on the coal resources of the Crossville quadrangle was revised by Charles Butts for publication by the State.

A report on the commercial marbles of the southern Appalachian region, prepared in cooperation with the geological surveys of Tennessee, Alabama, and Georgia by T. Nelson Dale, has been completed. Mr. Dale also contributed the economic part of a bulletin on the marbles of eastern Tennessee which is to be published by the State Geological Survey.

Some progress was made in the preparation of the report on the geology and mineral resources of the Waynesboro quadrangle by H. D. Miser. A report on the structure of the Waynesboro quadrangle, with special reference to oil and gas, of which the late A. H. Purdue, State geologist, was joint author, was completed by Mr. Miser and has been published by the State Survey in "The resources of Tennessee."

An outline of the petroleum geology of Tennessee is in preparation by E. W. Shaw.

The results of the examination of some of the greensands of western Tennessee, to show their potash content, are given in a paper by G. H. Ashley, printed as Bulletin 660-B.

Early Paleozoic fossils, which were sent to the office by the field geologists, were determined by E. O. Ulrich.

TEXAS.

The search for potash at Cliffside, 6 miles northwest of Amarillo, Tex., was continued during the early part of the summer until the well, at a depth of over 1,700 feet, had passed the horizon of the supposed potash salts without encountering potash of commercial value. The capacity of the rig having been reached and the available funds expended, boring was discontinued in October.

The field sampling and testing of the salts and brines encountered in boring wells in the "Red Beds" of western Oklahoma, northern Texas, and eastern New Mexico, sampled through the cordial cooperation of the companies, was continued by R. K. Bailey.

The quicksilver deposits of the Terlingua district were examined in March by F. L. Ransome, and the manganese ore deposits near Shumla were investigated, sampled, and estimated by J. B. Umpleby.

The general structure and the coals of the Santo Tomas coal fields in Webb County were examined by G. H. Ashley, whose report thereon is published as Bulletin 691-I.

The investigation of the salt domes of the Coastal Plain, including studies of the origin and differentiation of the salt, sulphur, oil, gas, and water and of the geologic structure, were continued by G. S. Rogers until late in the winter, when he was detailed to other investigations of greater military importance. A paper on the origin of the salt domes of Texas and Louisiana was contributed by Mr. Rogers for publication in the proceedings of the American Institute of Mining Engineers. Oil indications and reported structure at a number of points in Smith, Wood, and Delta counties were examined during the winter by O. B. Hopkins and Sidney Powers.

Sulphur deposits were examined with the estimation of reserves by P. S. Smith and W. O. Hotchkiss in October in cooperation with the engineers of the Bureau of Mines.

In December the study of a part of northeastern Texas bordering on Red River was resumed by L. W. Stephenson for the purpose of completing a manuscript on the stratigraphy and structure and on the correlation of the formations in that part of northeastern Texas. In this work Mr. Stephenson was joined for a time by O. B. Hopkins and Sidney Powers, who gave special attention to mapping the structure and investigating the oil possibilities of Fannin, Hunt, and

Grayson counties. Mr. Stephenson's report on the area is in press as Professional Paper 120–H. Fossils from the Hueco and Bend formations and from the Eocene have been examined in the office by G. H. Girty and C. W. Cooke, respectively.

Papers on the Corsicana oil and gas field, by G. C. Matson and O. B. Hopkins, and the Palestine and Brenham salt domes, by Mr. Hopkins, have been issued as parts F and G of Bulletin 661.

Information regarding the water supply for an aviation camp site at San Leon was furnished by T. W. Vaughan, who also furnished the Signal Corps general information on the ground-water conditions about San Antonio. Information on water supply at Leon Springs was supplied to the constructing quartermaster at that place.

Material for the description of the geographic features and their origin in and about Camp Travis was gathered by L. W. Stephenson for printing on the back of the San Antonio topographic map.

Physiographic descriptions of the Brackett, Nueces, and Rock Springs quadrangles were prepared by T. W. Vaughan for use in teaching soldiers the interpretation of topographic maps.

UTAH.

An examination of the structure and oil possibilities of the Green River Desert south of the Denver & Rio Grande Railroad, north of San Rafael River and east of San Rafael Reef, was made, with classification of the land, by W. B. Emery, assisted during the early part of the field season by H. S. Palmer. Later the work was continued until the close of the season by Harvey Bassler, who made a special examination of coal lands in Salina Canyon, where there was a desire to open new coal lands. The office work in preparing reports on the Salina Canyon area was done by Eugene Stebinger.

A specimen of tungstenite, a new tungsten sulphide, from Alta, was identified by R. C. Wells and described in an unofficial paper by him and B. S. Butler. Later E. S. Larsen examined the deposit. Other tungsten (scheelite) deposits 17 miles north of Lucin, near Emigrant Spring, Box Elder County, and near Gold Hill and on Trout Creek, Tooele County, were examined by F. L. Hess. A new type of molybdenum deposit in which ilsemannite impregnates sandstone and which occurs near Ouray was examined by Mr. Hess.

Manganese ores of Grand, Utah, Tooele, and Juab counties were studied by J. T. Pardee in May, and press notices containing the results were prepared for immediate publication.

The detailed field study of the geology and ore deposits of the Cottonwood and American Fork districts by B. S. Butler and F. C. Calkins was suspended near the end of the field season of 1917, on account of the urgent need for the services of these geologists in war-mineral work of more pressing importance.

Professional Paper 111, on the ore deposits of Utah, by B. S. Butler and G. F. Loughlin, is in press.

Supplementary office work was done on the reports on the Tintic and Ophir districts by G. F. Loughlin. The Tintic report has been submitted for publication as Professional Paper 107, and the report on "Zinc carbonate and related copper carbonate ores at Ophir, Utah," has been issued as Bulletin 690–A. Mr. Loughlin also completed and submitted a paper on "Two lamprophyre dikes near Santaquin and Mount Nebo, Utah," which was published as Professional Paper 120–E.

The preparation of an economic report on the Sunnyside-Wellington district and of a short report on the Farnham anticline, in Carbon County, by F. R. Clark, was interrupted in order that Mr. Clark might participate in the oil mapping of the Osage Reservation, Okla.

Several potash plants near Great Salt Lake were visited by H. S. Gale, and a brief review of the recent developments for the production of potash from the various alunite properties about Marysvale was made by V. C. Heikes, and a report thereon filed

Collections of fossils from the Carboniferous and Lower Triassic were studied by G. H. Girty, and from the Jurassic by T. W. Stanton.

"Geology of the Navajo country—a reconnaissance of parts of Arizona, New Mexico, and Utah," by H. E. Gregory, has been published as Professional Paper 93.

The deposits of oil shale in the Uinta Basin, northeastern Utah, and at several other localities in the State are described by D. E. Winchester in Bulletin 691–B.

A brief report on the Lost Creek coal field, Morgan County, Utah, by F. R. Clark, is in press as Bulletin 691–L. A paper on the Green River Desert section was transmitted by W. B. Emery for unofficial publication.

A paper giving the results of "A geologic reconnaissance of the Uinta Mountains, northern Utah, with special reference to phosphate," by A. R. Schultz, is contained in Bulletin 690–C.

VERMONT.

The physical features of Vermont are described by Arthur Keith in a geographic manual of New England now nearing completion.

Descriptions of Vermont granites are included in the bulletin on the granites of New England, the manuscript of which has been practically completed by T. Nelson Dale.

VIRGINIA.

The areal and structural study of the Shady limestone and its contiguous formations through the manganiferous region of the Valley of Virginia was completed by G. W. Stose, F. J. Katz, and H. D.

Miser. A short report by Messrs. Stose, Miser, Katz, and D. F. Hewett on the "Possibilities for manganese on certain undeveloped tracts in the Shenandoah Valley" has been published as Bulletin 660-J. A more extended report with detailed descriptions and maps of the belt has been prepared for transmission for publication by the State Geological Survey, with which this work was done in cooperation.

A reconnaissance examination of the manganese ore deposits in Bland County was made in June by G. W. Stose in association with E. G. Spilsbury, of the Bureau of Mines.

A report, by G. H. Ashley, on greensand deposits, with special reference to their availability as a source of potash, was published in Bulletin 660-B.

The economic map of Buchanan County was completed by Henry Hinds and T. K. Harnsberger for transmission to the State and is now in process of engraving. The preparation of the descriptive text has been delayed by the resignation of Mr. Harnsberger and the absence of Mr. Hinds, but it is practically complete. This work also was done in cooperation with the State Geological Survey, by which the results are to be published.

Descriptions of marbles in Virginia are included in a report on the commercial marbles of the southern Appalachian region, which has been completed, by T. Nelson Dale.

An examination of the ground waters in the vicinity of Yorktown was made by T. W. Vaughan, and a report on the water supply was transmitted to the Chief of Yards and Docks, Navy Department, by whom the investigation was requested. Mr. Vaughan also furnished to the Signal Corps information on the ground water conditions near Mount Vernon. The water supply for the aviation camp at Langley Field was examined by L. W. Stephenson. In compliance with a request from the Construction Quartermaster of the War Department, a memorandum on the probability of developing an adequate water supply for Camp Lee was prepared by Mr. Vaughan. Sand and gravels in the vicinity of Camp Humphreys were examined and similarly reported on by N. H. Darton. Data on water supply at Hampton Roads were furnished to the Pig Point Depot and the United States Navy; and information on ground water was furnished the Signal Corps.

The geographic features of the region including Langley Field, near Hampton, have been examined and a description of their origin was submitted by L. W. Stephenson for publication on the back of the Hampton topographic map.

The Piedmont Plateau of this State has been examined by Laurence LaForge, the geographic features of the valley region by G. W. Stose, and the Allegheny region by M. R. Campbell, for description in a geographic manual of the Virginian region. The chapter on the Coastal Plain province of the State has been written by L. W. Stephenson.

The country about Camp Lee was visited by M. R. Campbell and L. W. Stephenson in company with A. W. Giles, of the State Geological Survey, by whom a description of the geographic features of the area and their origin was prepared in cooperation for publication as a pamphlet by the Geological Survey of Virginia.

A report on the tin deposits near Cash Creek was prepared by H. G. Ferguson and has been published by the Virginia Geological Survey.

Pleistocene plants and early Paleozoic invertebrates have been examined by F. H. Knowlton and E. O. Ulrich, respectively.

Corundum deposits near Whittles were examined and sampled for testing by F. J. Katz. The results are given in the report on abrasives in the current Mineral Resources volume. The field investigation was made in cooperation with the State geologist, T. L. Watson. The rutile deposits at Arrington have been examined by F. L. Hess.

The physical and general geologic features of the Urbanna quadrangle and the surrounding region were examined in the later part of May and in June by W. T. Lee, W. C. Mansfield, and R. D. Mesler, with particular attention to the acquisition of information of military importance.

WASHINGTON.

Manganese deposits near Anacortes, Omak, and in the Olympic Mountains; arsenic deposits near Mineral; chromite on Cypress Island; tungsten near Bumping Lake; molybdenum in the Cascade district; strontium near La Conner; epsomite near Ironville; diatomaceous earth near Quincy; and platinum near Riverside, Quillayute, Anacortes, and Yacolt, Wash., were examined by J. T. Pardee. A press bulletin was issued on the manganese deposits in the Olympic region.

Tungsten ore in the vicinity of Blue Grouse Mountain, Cathedral Peak, and Silver City were examined by F. L. Hess.

The magnesite deposits of Stephens County were examined by R. W. Stone, and the results were communicated promptly to the press and published in the annual report on magnesite in Mineral Resources.

Coal lands near Fairfax and Mineral were examined for classification in order that parties desiring immediately to open coal mines might proceed to increase the coal production of the State.

A notice descriptive of the salines in Okanogan County examined by J. T. Pardee was communicated to the press.

WEST VIRGINIA.

A study of the stratigraphy and coals of the Abram Creek-Stony River basin, W. Va., was made by G. H. Ashley to procure data needed by the Fuel Administration. A report with maps describing the region is in preparation for issue in "Contributions to economic geology."

In response to the request of the Navy Department, a large number of coal mines in the New River and Pocahontas fields and in the Potomac basin were sampled by G. H. Ashley, W. T. Lee, E. W. Shaw, E. T. Hancock, and Eugene Stebinger, in cooperation with the Bureau of Mines.

At the request of the Navy Department, the natural-gas resources in portions of Boone and Kanawha counties were examined by E. W. Shaw for the purpose of advising that department as to the acquisition of gas territory as a source of fuel for the armor and projectile plants being built near Charleston. In this work this Survey enjoyed the cordial cooperation and advice of the State geologist, I. C. White.

Information as to the coal resources of several regions in the southern part of the State was furnished by G. H. Ashley and David White for the use of various governmental agencies. The cannel coals of the State are described by Mr. Ashley in a paper on "Cannel coal in the United States," printed as Bulletin 659.

A paper on glass sand near Berkeley Springs, by R. W. Stone, has been published outside the Survey. A brief paper on the Cabin Creek oil field is in preparation by E. W. Shaw.

WISCONSIN.

A report on the "Pleistocene geology of southeastern Wisconsin," by W. C. Alden, with an introduction by T. C. Chamberlin, has been published as Professional Paper 106.

A portion of northern Wisconsin has been under investigation for description in a report by Frank Leverett on the glacial history of the Lake Superior region.

Physiographic descriptions of the Ripon and Neshkoro quadrangles have been prepared and transmitted by W. C. Alden for publication, and a description of the physical features of The Dells quadrangle has been prepared by Mr. Alden.

To furnish correlations needed by the State geologist, field investigations of the stratigraphy and fossils of the Ordovician and Silurian formations were made by E. O. Ulrich, the field expenditures being borne by the cooperating State. The faunas of the Mayville dolomite and other Niagaran formations have been studied in the office by Mr. Ulrich.

WYOMING.

Over 50 anticlines, many of which contain oil, are described by D. F. Hewett and C. T. Lupton in a report on "Anticlines in the southern part of the Big Horn Basin, Wyo.," which has been issued as Bulletin 656. "The Salt Creek oil field, Wyo.," by C. H. Wegemann, a much more detailed description than that earlier published, has been issued as Bulletin 670. The oil possibilities of the extreme eastern part of the State are broadly treated by N. H. Darton in Bulletin 691-A, "The structure of parts of the central Great Plains."

A brief reconnaissance of the structure along the southwest front of the Black Hills uplift from Upton to Ardmore was made by E. T. Hancock, and the principal conclusions were issued to the press. This reconnaissance is preliminary to detailed studies of the region.

A manganese deposit near Marshall was examined by E. L. Jones, jr., and chromite and asbestos deposits at a number of localities by J. S. Diller.

A description of "A fossil flora from the Frontier formation of southwestern Wyoming," by F. H. Knowlton, is given in Professional Paper 108-F.

Cretaceous fossils forwarded by the field geologists to the office have been under examination by T. W. Stanton, and a monographic report on the Jurassic ammonites was submitted by J. B. Reeside, jr., prior to his entry on military service. Vertebrate fossils from this State are described by T. D. A. Cockerell in a paper on "Some American Cretaceous fish scales," to be published as Professional Paper 120-I.

A report on the "Relations of the late Paleozoic and early Mesozoic formations of southwestern Montana and adjacent parts of Wyoming," by D. Dale Condit, is in press as Professional Paper 120-F, and a paper by Eliot Blackwelder on "New geological formations in western Wyoming" has been published outside the Survey. The "Stratigraphy of the Hanna Basin, Wyo.," is described by C. F. Bowen in Professional Paper 108-L.

CANAL ZONE.

Reports on the geology, paleontology, and physiography of the Canal Zone, now in course of publication as Bulletin 103 of the United States National Museum, received some attention in the office by T. W. Vaughan, under whose direction the materials on the geologic history of the Canal Zone, Central America, and the West Indies have been gathered in cooperation with other governmental bureaus and scientific institutions.

WEST INDIES, CENTRAL AMERICA, AND SOUTH AMERICA.

The chrome and manganese ore deposits of Cuba were examined by E. F. Burchard in cooperation with Albert Burch, of the Bureau of Mines, between February 18 and April 29. Estimates of the probable output of these ores from Cuba in 1918 and 1919 and of reserve tonnage were made, and the results were promptly communicated to the bureaus concerned and to the War Department, the Shipping Board, and the War Industries Board through the Joint Information Board. A press bulletin on the situation with respect to these ores in Cuba has been prepared by Mr. Burchard.

A paper on the "Cenozoic history of Central America and the West Indies," summarizing the results of geologic, paleontologic, and physiographic explorations in that part of the hemisphere, under supervision of T. W. Vaughan, was prepared by him for unofficial publication.

Information as to the water resources of St. Thomas, Virgin Islands, was supplied by Mr. Vaughan for the use of the insular government.

As in previous years, the paleontologic specialists of the Survey have been called on by the National Museum and by other scientific institutions of this or other governments to examine and report on fossils in order to determine the geologic formations. The fossil Foraminifera from various West Indian localities received attention from J. A. Cushman, who completed a monographic account of all collections then available, the work being done at no cost to the Survey. Pleistocene fossils from Panama, Mexico, and Uruguay have been examined by W. H. Dall, who also reported on Tertiary shells from Uruguay. Mr. Dall has also studied Oligocene fossils from Venezuela. Cretaceous fossils from Guatemala were examined by T. W. Stanton.

During June investigations of deposits of minerals of war importance were carried on by H. G. Ferguson in the Dominican Republic and by Max Roesler in Porto Rico.

Hoyt S. Gale was detailed for two months under the Office of the Chief of Engineers of the War Department for the investigation of the occurrence and manufacture of potassium nitrate in Guatemala. A special report on this subject was submitted to the War Department and a copy was deposited in the library of the Survey.

A summary of the results of an investigation of potash deposits in the Pintados Salar, in the nitrate fields of northern Chile, was contributed by Mr. Gale to the Engineering and Mining Journal of April 13, 1918.

CANADA.

Mesozoic and Tertiary plants forwarded to the Survey from western Canada were examined by F. H. Knowlton. Pleistocene and Tertiary invertebrates from Alberta were similarly examined by W. H. Dall, and Cretaceous invertebrates by T. W. Stanton. Carboniferous fossils from the Mackenzie Valley were studied by G. H. Girty.

DIVISION OF ALASKAN MINERAL RESOURCES.

APPROPRIATION AND CLASSES OF WORK.

Under the appropriation of $100,000 made for the continuation of the investigation of the mineral resources of Alaska, the work during the year has been concentrated chiefly upon special investigations of the materials that are in special demand during the war, such as platinum, tin, chromite, tungsten, nickel, sulphur, copper, and fuels. Areal geologic surveys were restricted to work in the region tributary to the Government railroad and to the completion of projects already under way.

PERSONNEL.

On July 1, 1917, the personnel of the division consisted of 1 acting geologist in charge, 9 geologists, 1 topographic engineer, 1 hydraulic engineer, 3 clerks, and 1 draftsman on annual salaries, 1 field assistant, and 7 camp hands and recorders. On June 30, 1918, the personnel included 1 acting geologist in charge, 7 geologists, 1 topographic engineer, 1 hydraulic engineer, and 3 clerks on annual salaries and 3 geologists on per diem salaries. The field force also included 10 temporary field employees.

The following members of the division of Alaskan mineral resources now hold commissions and are engaged in active military service:

Alfred H. Brooks, major, Engineer Officers' Reserve Corps.
J. W. Bagley, major, Engineer Officers' Reserve Corps.
E. M. Aten, captain, Quartermaster Department.
C. E. Giffin, captain, Engineer Officers' Reserve Corps.
G. L. Harrington, first lieutenant.

FIELD WORK DURING THE SEASON OF 1917.

Areas covered and allotments.—Eleven parties were engaged in Alaska surveys and investigations during 1917. Nine of the parties were engaged in geologic surveys, one in topographic surveys, and one in stream gaging. The areas covered by reconnaissance geologic surveys on a scale of 1 : 250,000 (4 miles to an inch) amount to 1,750 square miles; by detailed geologic surveys on a scale of 1 : 62,500 (1 mile to an inch), 275 square miles. Much of the time of the geologists was devoted to the investigation of special problems relating to the occurrence of mineral deposits, the results of which can not be expressed in terms of area. About 1,050 square miles was covered by reconnaissance topographic surveys on a scale of 1:250,000 (4 miles to an inch). In cooperation with the Forest Service, stream gaging was continued in southeastern Alaska.

The following tables show the allotments, including both field and office work, of the total appropriation of $100,000 for the fiscal year 1918, classified by regions, by kinds of surveys, and by kinds of expenditures. In addition to these funds, a balance of about $6,000 from last year's appropriation was expended in equipping parties for the season's field work. In the first table the general office expenses are apportioned to the several allotments, account being taken of variations in character of work. The results are expressed in round numbers. Salaries of the permanent staff are included up to the end of the fiscal year 1918, but expenses other than these include only the cost of field and office work during 1917. The "general investigations" include, with other things, the cost of collecting mineral statistics, of office work relating to the field investigations of previous seasons, and of investigations under the direct administration of the geologic branch. A balance of about $37,300 is available for equipping the field parties in 1918.

Approximate general distribution of appropriations for Alaska investigations, 1917-18.

Southeastern Alaska	$20,300
Prince William Sound, Copper River, and Controller Bay	10,300
Cook Inlet and Susitna Basin	7,600
Southwestern Alaska	3,900
Yukon basin	5,500
Seward Peninsula	1,900
General investigations	13,200
To be allotted to field work, 1918	37,300
	100,000

Approximate allotments to different kinds of surveys and investigations, 1917-18.

Reconnaissance geologic surveys	$9,100
Detailed geologic surveys	3,400
Special geologic investigations	17,500
Reconnaissance topographic surveys	4,000
Investigations of water resources	5,400
Collection of mineral statistics	1,600
Miscellaneous, including administration, inspection, clerical salaries, office supplies and equipment, and map compilation	21,700
To be allotted to field work, 1918	37,300
	100,000

Allotments for salaries and field expenses, 1917-18.

Scientific and technical salaries	$24,964
Field expenses	18,536
Clerical and administrative salaries and miscellaneous expenses	19,200
To be allotted to field work, 1918	37,300
	100,000

The following table exhibits the progress of investigations in Alaska and the annual grant of funds since systematic surveys were begun in 1898. It should be noted that a varying amount is spent each year on special investigations that yield results which can not be expressed in terms of area. In 1917 seven parties were engaged in such investigations.

Progress of surveys in Alaska, 1898–1917.

Year.	Appropriation.	Areas covered by geologic surveys.			Areas covered by topographic surveys.[a]					Investigations of water resources.	
		Exploratory (scale 1:625,000 or 1:1,000,000).	Reconnaissance (scale 1:250,000).	Detailed (scale 1:62,500).	Exploratory (scale 1:625,000 or 1:1,000,000).	Reconnaissance (scale 1:250,000; 200-foot contours).	Detailed (scale 1:62,500; 25, 50, or 100 foot contours).	Lines of levels.	Bench marks set.	Gaging stations maintained part of year.	Measurements of stream volume.
		Sq. m.	*Sq. m.*	*Sq. m.*	*Sq. m.*	*Sq. m.*	*Sq. m.*	*Miles.*			
1898	$46,189	9,500	....	....	12,840	2,070	....	....	....	......	......
1899	25,000	6,000	....	....	8,690	....	....	....	....	......	......
1900	60,000	3,300	6,700	....	630	11,150	....	....	....	......	......
1901	60,000	6,200	5,800	....	10,200	5,450	....	....	....	......	......
1902	60,000	6,950	10,050	....	8,330	11,970	96	....	....	......	......
1903	60,000	5,000	8,000	96	....	15,000	....	....	....	......	......
1904	60,000	4,050	3,500	....	800	6,480	480	86	19	......	......
1905	80,000	4,000	4,100	536	....	4,880	787	202	28	......	......
1906	80,000	5,000	4,000	421	....	13,500	40	....	....	14	286
1907	80,000	2,600	1,400	442	....	6,120	501	95	16	48	457
1908	80,000	2,000	2,850	604	....	3,980	427	76	9	53	556
1909	90,000	6,100	5,500	450	6,190	5,170	444	....	....	81	703
1910	90,000	....	8,635	321	....	13,815	36	....	....	69	429
1911	100,000	8,000	10,550	496	....	14,460	246	....	....	68	309
1912	90,000	....	2,000	525	....	....	298	....	....	69	381
1913	100,000	3,500	2,950	180	3,400	2,535	287	....	....	......	......
1914	100,000	1,000	7,700	325	600	10,300	10	....	....	......	......
1915	100,000	....	10,700	200	....	10,400	12	3	2	9	......
1916	100,000	....	5,100	636	....	9,700	67	....	....	20	......
1917	100,000	....	1,750	275	....	1,050	....	....	....	19	......
	1,561,189	73,200	101,285	5,507	51,680	148,030	3,731	453	74	......	......
Percentage of total area of Alaska...	....	12.48	17.27	0.94	8.81	25.24	0.64	....	....	......	......

[a] The Coast and Geodetic and International Boundary surveys and General Land Office have also made topographic surveys in Alaska. The areas covered by these surveys are, of course, not included in these totals.

General work.—G. C. Martin, acting geologist in charge, was engaged in office work till August 1, when he started for Alaska. Two days were spent in Juneau, collecting data on mining developments. The time from August 15 to 21 was spent in the Katalla oil field. The time from August 26 to September 6 was devoted to a field conference with the engineer in charge of the Government coal mines in the Matanuska Valley. A brief visit was then made to the Nenana coal field. He returned to Washington on October 11.

During Mr. Martin's absence in Alaska, F. H. Moffit was acting geologist in charge and devoted considerable time to executive work. Since June 11, 1917, most of Mr. Moffit's time has been given to assisting Maj. Bagley in his investigations of airplane mapping, and since November he has devoted himself exclusively to that work.

E. M. Aten continued as office assistant to the acting geologist in charge and assisted in the collection of statistics of production of precious metals in Alaska until July 13, when he went into the military service as captain in the Quartermaster Department, U. S. R. After that date Miss L. M. Graves took up Mr. Aten's administrative duties, and T. R. Burch assisted in the collection and compilation of the mineral statistics.

A systematic investigation of the heavy placer minerals of Alaska was begun by G. L. Harrington and J. B. Mertie, jr., during the year. This work has already yielded results of considerable value. Platinum was found in concentrates from Aloric River, in the Kuskokwim Delta, and also from Marshall. Tin ore (cassiterite) was found in concentrates from Yentna River in such amount as to indicate that it possibly occurs in commercial quantities. Cassiterite was also found in small quantities in concentrates from Boob Creek, in the Tolstoi district; from Willow Creek, near Nome; and from Riglagalik River, in the Kuskokwim Delta. Scheelite was determined in a number of concentrates from the vicinity of Nome and from Bonanza Creek, at the base of Seward Peninsula. These localities are not new but are important as indicating that the mineral may occur in sufficient amount to be a valuable by-product of placer mining. Scheelite was also found at a new locality on Jack Wade Creek.

Theodore Chapin was detailed to work for the division of geology from December 19, 1917, to April 17, 1918. S. R. Capps and A. G. Maddren have been detailed to work for the division of geology since February 23 and June 4, respectively.

Southeastern Alaska.—Studies of the ore deposits and mining developments in the Ketchikan district were continued by Theodore Chapin, who devoted the time from July 10 to 20 and from September 25 to November 4 to this work. Especial attention was given to the copper deposits.

An investigation of the reported occurrence of platinum at Lituya Bay was made by J. B. Mertie, jr., in July. Mr. Mertie also investigated the iron ores of southeastern Alaska in October.

A reconnaissance of the geology and mineral deposits of the Sitka district, with especial reference to the nickel-bearing copper ore on the west side of Chichagof Island, was made by R. M. Overbeck.

The investigation of the water resources of southeastern Alaska, begun in 1915 under a cooperative agreement with the Forest Service, was continued. G. H. Canfield, who had charge of this work, maintained 17 automatic gages throughout the year. In addition to these gages 3 others were installed in cooperation with individuals and corporations. This work could not have been carried on without the cordial cooperation of the Forest Service, many members of which have given substantial aid. Particular acknowledgment should be made to W. G. Weigle, special agent at Ketchikan, and to Leonard Lundgren, district engineer at Portland, Oreg.

A study of the Paleozoic rocks of southeastern Alaska was assigned to Edwin Kirk. He left Washington July 1 and remained in the field until the later part of September, studying the stratigraphy and making large collections of fossils from various localities in southeastern Alaska.

Prince William Sound and Copper River region.—B. L. Johnson continued his investigations of mining developments in the Prince William Sound region and the eastern part of Kenai Peninsula and made a detailed survey of part of the Jack Bay district. Mr. Johnson devoted the time from July 14 to October 19 to this work.

The reconnaissance topographic survey of the Prince William Sound region, begun several years ago, was extended eastward by D. C. Witherspoon. The season's work covered 1,000 square miles, including the eastern shore line of Prince William Sound from Fidalgo Bay to the entrance of Orca Inlet, which was mapped on a scale of 1 : 250,000. In addition, Mr. Witherspoon surveyed the eastern end of Hawkins Island.

A brief investigation of the reported nickel ore in the Copper River Valley was made by R. M. Overbeck, who devoted a few days in August to this work.

Cook Inlet, Susitna region, and southwestern Alaska.—The progress of construction of the Government railroad in Alaska created a demand for information on the geology and mineral resources of the region tributary to it. S. R. Capps was charged with the investigation of an area tributary to the railroad in the upper Susitna Valley. Between July 1 and September 7 he made geologic reconnaissance surveys covering an area of more than 1,500 miles on a scale of 1:250,000 and also investigated the copper and gold lodes of the western Talkeetna Mountains and of the Willow Creek district.

Investigations of the platinum deposits of the Yentna district and of the chromite deposits of lower Cook Inlet were made by Mr. Mertie.

The sulphur deposits on Makushin and Akun islands and near Stepovak Bay were investigated by A. G. Maddren. Mr. Maddren also made a brief visit to the beach placers on the west side of Kodiak Island. His field work extended from July 21 to September 22.

Yukon region.—The work in the Yukon region included especial investigations of the tungsten, tin, and platinum deposits of the Fairbanks, Hot Springs, and Ruby districts by Theodore Chapin, a special investigation of platinum deposits in the Tolstoi district by G. L. Harrington, and an examination of the coal along the main line of the railroad west of Nenana River by G. C. Martin. No areal surveys were undertaken.

Seward Peninsula.—Work on Seward Peninsula included investigations by G. L. Harrington of the gold and platinum placers of the Candle and Koyuk districts, of the placer and lode tin and the graphite of the Yukon district and Imuruk Basin, and of the general mining developments. No areal surveys were made.

FIELD WORK FOR THE SEASON OF 1918.

Field work was begun before the end of the fiscal year (during May and June) by seven parties, as indicated below. D. C. Witherspoon began a topographic reconnaissance survey (scale 1:250,000) of the region adjacent to the Government railroad between Talkeetna River and Broad Pass. G. H. Canfield is continuing the investigation of the water powers of southeastern Alaska in cooperation with the Forest Service. R. M. Overbeck began a geologic reconnaissance survey of the Tolovana placer district. Edwin Kirk was detailed from the division of geology for a geologic reconnaissance survey of parts of Chichagof and Admiralty islands. George H. Girty was also detailed from the division of geology for special investigations of the Carboniferous rocks of southeastern Alaska and Yukon River. Edward Steidtmann, of the University of Wisconsin, and S. R. Cathcart, of Yale University, have been engaged to investigate the tin deposits of the York region. A. C. Gill, of Cornell University, has been engaged to investigate the chromite deposits of Cook Inlet. All these surveys and investigations will continue into the fiscal year 1918–19.

ALASKA OFFICE.

A branch office of the Geological Survey, in charge of Theodore Chapin as resident geologist, has been opened at Anchorage, and this will be his general headquarters throughout the year. It will be his purpose to do everything possible to aid the mining industry in the region tributary to the Government railroad. The plans not only contemplate close cooperation with those in charge of the operation of the Government coal mines, in the Matanuska Valley, but have the additional purpose of keeping the Geological Survey in touch with all local developments in mining and prospecting and of furnishing whatever aid may be possible by giving information, advice, and publications to those engaged in mining and prospecting.

COLLECTION OF STATISTICS.

The collection of statistics of production of metals in Alaska, begun by the Alaska division in 1905, was continued as usual. Preliminary estimates of mineral production for 1917 were published on January 1, 1918.

PUBLICATIONS.

During the year the Survey published three bulletins (Nos. 655, 667, and 675) and one water-supply paper (No. 418) relating to Alaska. Four topographic maps (lower Matanuska Valley, by R. H. Sargent, scale 1:62,500, contour interval 50 feet; Pl. I, Bulletin 655; Pl. I, Bulletin 667; and Pl. II, Bulletin 675) were published during the year.

Four bulletins (Nos. 662, 664, 668, and 683), two professional papers (Nos. 109 and 120–D), and eight topographic maps (Juneau and vicinity, by D. C. Witherspoon, scale 1:24,000, contour interval 50 feet; Pl. I, Bulletin 668; Pls. I and II, Bulletin 683; and Pls. I, III, IV, and V, Professional Paper 109) were in press at the end of the year.

Manuscripts of the following reports are completed:

The marble resources of southeastern Alaska, by E. F. Burchard (Bulletin 682).
The Kantishna region, Alaska, by S. R. Capps.
The Porcupine district, by H. M. Eakin.

The following reports are in hand:

The lower Kuskokwim region, by A. G. Maddren.
The Kotsina-Kuskulana district, by F. H. Moffit.
The upper Matanuska basin, by G. C. Martin.
Geology of the Glacier Bay and Lituya region, Alaska, by F. E. Wright and C. W. Wright.
Geology of the region along the international boundary from Porcupine River to the Arctic Ocean, by A. G. Maddren.
The Yakataga district, by A. G. Maddren.
The Mesozoic stratigraphy of Alaska, by G. C. Martin.
The Valdez district, by B. L. Johnson.
The Ruby-Kuskokwim region, by J. B. Mertie, jr., and G. L. Harrington.
The Cretaceous and Tertiary floras of Alaska, by Arthur Hollick.
The Ketchikan district, by Theodore Chapin.
The geology of Latouche Island, by B. L. Johnson.
A geologic reconnaissance in the northern part of the Yukon-Tanana region, Alaska, by Eliot Blackwelder.
The western Talkeetna Mountains, by S. R. Capps.

Office work on the maps listed below has been completed:

Kotsina-Kuskulana district, by D. C. Witherspoon; scale, 1:62,500; contour interval, 100 feet.
Lower Kuskokwim region, by A. G. Maddren; scale, 1:500,000; contour interval, 400 feet.
Ruby district, by C. E. Giffin and R. H. Sargent; scale, 1:250,000; contour interval, 200 feet.

The following topographic maps are in hand:

Innoko-Iditarod region, by R. H. Sargent and C. E. Giffin; scale, 1:250,000; contour interval, 200 feet.
Anchorage-Matanuska region, by R. H. Sargent and others; scale, 1:250,000; contour interval, 200 feet.
Yukon-Tanana Valley; compiled; scale, 1:500,000; contour interval, 400 feet.

Glacier Bay region; compiled; scale, 1:250,000, contour interval, 200 feet.

Kantishna region, by C. E. Giffin; scale, 1:250,000; contour interval, 200 feet.

Port Wells region, by J. W. Bagley; scale, 1:250,000; contour interval, 200 feet.

Jack Bay district, by J. W. Bagley; scale, 1:62,500; contour interval, 50 feet.

Fidalgo-Gravina district, by D. C. Witherspoon; scale, 1:250,000; contour interval, 200 feet.

DIVISION OF CHEMICAL AND PHYSICAL RESEARCH.

The scientific force of the division of chemical and physical research, in charge of G. F. Becker, geologist, consists of 1 geologist, 8 chemists, and 2 physicists. Though not formally organized as such, the division consists in effect of two sections, the work in chemistry being in charge of George Steiger, chief chemist, and that in physics being under the immediate supervision of C. E. Van Orstrand. The investigations of the division were considerably retarded during the year through conditions incident to the move into the new building.

The work in chemistry includes primarily the tests necessary to the determination of rocks, ores, and minerals collected by or received at the Survey; qualitative and quantitative determinations of specimens and samples collected by the geologists; and researches relating to the various problems in geology on which the Geological Survey is engaged. During the year 1,014 quantitative analyses and 1,133 qualitative tests of rocks, minerals, and waters were made, principally on samples of ores and commercially valuable minerals. Analyses of a great many samples containing nitrates or potash were made by W. B. Hicks, R. K. Bailey, and Roy Backus. Mr. Backus is an additional chemist detailed, in cooperation, from the Ordnance Department of the War Department. Mr. Bailey spent the greater part of the year in studying and testing for potash or nitrates the well drillings and brines from a number of wells in progress of sinking in western Oklahoma and eastern New Mexico. Routine analyses of oil-field waters in Louisiana and Texas were made by Chase Palmer, who also made scientific analyses of marble samples, chiefly from Tennessee and Alabama, for use in a general geologic report on the marbles of the southern Appalachian region. Several elaborate analyses of native alloys of the platinum metals from Alaska were made by R. C. Wells. Many analyses of ores of chromium, platinum, manganese, and sulphur were also made in this division.

The war problems associated with mineralogy, such as the discovery of new deposits and means of increasing the production of high-grade sheet mica or the development of supplies of zircon, have occupied much of the time of W. T. Schaller, who has compiled the annual statistical reports on production of precious stones and mica. Some progress has been made by Mr. Schaller on several manuscripts, and a number of mineralogic studies of essentially scientific character have occupied some of his time when he was not engaged in the compilation of information for various governmental agencies, Isotopic lead has been described by F. W. Clarke, in the Proceedings of the National Academy of Sciences, and a paper on the "Inorganic constituents of two small crustacea," by Mr. Clarke and Benedict Salkover, has been published in the Journal of the Washington Academy of Sciences. Mr. Clarke's work in calculations of atomic weights is being extended. He also has in preparation a new edition of "The data of geochemistry."

Work on the problems of physical chemistry, in charge of R. C. Wells, has been largely suspended on account of the pressure for analyses indirectly connected with war investigations. However, the study of the origin of certain oil-field waters as related to the presence of gases has been continued in cooperation with R. V. A. Mills in the division of geology. A joint manuscript entitled "The evaporation and concentration of waters associated with petroleum and natural gas" has been submitted for publication as a professional paper. A report on "New determinations of carbon dioxide in water of the Gulf of Mexico," by Mr. Wells, has been issued as Professional Paper 120-A. An important new mineral, tungstenite or bisulphide of tungsten, discovered in a specimen of ore from the Emma mine, Salt Lake County, Utah, has been described in a joint paper by Mr. Wells and B. S. Butler, contributed to the Journal of the Washington Academy of Sciences. Another paper by Mr. Wells, "Extraction of potassium salts from the Pintados Salar, Tarapacá, Chile," was published in the Engineering and Mining Journal. Mr. Wells has also had charge of the preparation of the report on the production of sodium salts in the United States during 1917.

Experimental tests in the extraction of potash from greensands were witnessed and reported by W. B. Hicks, who, in conjunction with H. S. Gale, compiled the annual report on the production of potash in the United States. A paper on this subject was contributed by Mr. Hicks for publication in the Manufacturers Record. A report on the part played by fluorine in sericitization, based on investigations made by George Steiger, chief chemist, and Sidney Paige, has been transmitted for unofficial publication, and another by Mr. Steiger and E. S. Larsen, jr., on "Griffithite, nontronite, and alunogen," has been prepared for publication.

Researches in capillarity and heat conduction and an investigation of the part played by voids and interstitial spaces in the rocks have occupied the greater part of the attention of the geologist in charge, who was able to devote some time also to the theory of the formation of salt domes.

Observations of deep temperatures were made by C. E. Van Orstrand at several localities in West Virginia and Texas, those in West Virginia in cooperation with the State Geological Survey. By means of a specially constructed apparatus, Mr. Van Orstrand was able to observe the temperatures with greater accuracy than has ever before been possible. A preliminary report entitled "Apparatus for the measurement of temperatures in deep wells and temperature determinations in some deep wells in Pennsylvania and West Virginia" has been published by the Geological Survey of West Virginia. With the assistance of A. F. Melcher, Mr. Van Orstrand has made an extended tabulation and discussion of deep earth temperatures of the globe. Another paper by Mr. Van Orstrand, "Tables of the exponential function of the circular sine and cosine to radian argument," is ready for publication.

DIVISION OF MINERAL RESOURCES.

The division of mineral resources, in charge of H. D. McCaskey, geologist, embraces 32 geologists and engineer specialists in charge of the different mineral subjects, and a highly trained clerical and statistical staff of 43. For the more efficient accomplishment of the work branch offices are maintained in Denver, Salt Lake City, and San Francisco, with organization as described on page 87.

During the year this division has been the main source of information for the governmental war boards and other agencies that required data on the mineral production of the United States, its statistics, conditions, and prospects. The demands made upon it by the organizations responsible for the war mineral supplies and the war industries of the United States have increased enormously in scope as well as in number. Statistics of production have been gathered and compiled quarterly, monthly, weekly, and even daily, for some of the war minerals. Questionnaires revised to include new particulars needed by some war board have followed quickly other questionnaires that were themselves more comprehensive and searching than the preceding ones. Data of new classes have been gathered, and reports and statements in great numbers have been prepared to meet the special requirements of nearly every agency touching the mineral interests of the country. An idea of the scope of the work and of the calls made on the division may be gained by an inspection of Plate II.

A very important part of the work of the division this year has been the encouragement which has been given to producers of war minerals; buyers have been put into touch with miners, local metallurgic and mining troubles have been brought to the attention of the Bureau of Mines or other appropriate Government organizations, and help has been extended in procuring cars, fuel, and supplies for the operators.

The accomplishment of this task has been a test both of the experience of the Survey, covering 38 years of preparation of annual reports of production, and of the personnel, and it would not have been possible without the most complete cooperation of the other divisions of the geologic branch. The wisdom of the policy adopted by the Survey 15 years ago in assigning the preparation of these reports to geologists familiar with the deposits in the ground and with mining conditions has been especially evident this year, when it has been necessary to supplement the statements as to production and the progress of the industries by reports of the reserves in the ground and of their possible yield within certain periods. The great store of information collected by the Survey geologists during many years regarding the occurrence, distribution, and conditions of production of ores and minerals of different kinds in all parts of the United States is now proving to be of the greatest value not only to the Survey but to all other agencies in solving the mineral problems of the war.

By way of illustration, the specialists are called upon by the Shipping Board for estimates of the quantity of all war minerals that will probably be produced in the United States in the next 12 months and that must be transported by rail and by coastwise vessels in the calendar year, and for statements as to the need of importing certain minerals and estimates of the quantity required; or they are asked to advise the Capital Issues Committee of the Federal Reserve Board in regard to requests for permission to raise capital on mining property, and to give opinions about undeveloped deposits of war minerals that might profitably be developed to meet needs arising through present demands; or, again, they may advise the General Staff as to Allied and enemy mineral supplies, their location, extent, and utilization.

The successful campaign of the Shipping Board to save tonnage by decreasing mineral imports, through which 1,000,000 tons of shipping was released for military purposes, was based on the work of this division of the Survey.

Preliminary estimates of output in 1917 were issued in the form of special press bulletins in December, 1917, and during the early months of 1918, with reviews of conditions that prevailed during the year 1917, on the following subjects: Abrasives; aluminum and aluminum salts; arsenic; bauxite and bauxite abrasives; bromine; Portland cement; chromite; clay; copper; feldspar; gold and silver; granite paving industry; graphite; gypsum; iron ore; lead; lead and zinc pigments; lime; Indiana oolitic limestone; limestone and marble industry at Carthage, Mo.; lithium minerals; lithographic stone; magnesium; manganese; metal mine production in California, Colorado, Idaho, Montana, Nevada, New Mexico, Oregon, South Dakota, Texas, Utah, and Washington; mineral production in Alaska; mica; petroleum; oil fields east of Mississippi River; consumption of fuel oil by railroads; phosphate rock; platinum; potash; quicksilver; salt; strontium; sulphur and sulphuric acid; zinc; and zirconium.

The final figures (advance statement) of copper produced in 1917 have also been published.

As the necessity for adjusting importations, export licensing, allocations of shipping, etc., to the progress of domestic mineral production became more obvious, closer and more intimate action developed between this division and the War Trade, War Industries, and Shipping boards. To systematize and coordinate more fully the exchange of information, an informal joint committee was in December, 1917, arranged to act as a clearing house between this division and the above-named war boards, all of which were represented in its membership and Edson S. Bastin was designated chairman. The weekly, monthly, and quarterly statistical data on mineral production, stocks, commitments, etc., compiled in the division of mineral resources by the survey specialists were distributed to interested Governmental organizations by the cooperative committee, and these data, together with statistics of imports and exports were compiled by the committee in special forms, both graphic and tabular, for similar distribution. Occasional assistance was contributed by the division of planning and statistics of the Shipping Board in the special compilation of import and export statistics obtained from the Bureau of Foreign and Domestic Commerce.

In connection with the work of the cooperative committee it became apparent that some agency was needed to coordinate various mineral investigations conducted independently by several Government bureaus and boards, to provide a broader channel for the exchange of information, and to eliminate duplication of effort. Therefore, at the suggestion of the Geological Survey, through a call from the Secretary of the Interior, representatives of the different departments together with representatives of the Geological Survey, Bureau of Mines, statistical division of the War Industries Board, bureau of research of the War Trade Board, and committee on mineral imports and exports of the Shipping Board met on February 12, 1918, for discussion and to outline an organization. On February 14, in response to invitations sent out by the temporary chairman, the Director of the Survey, representatives of twenty bureaus and divisions of the war boards organized the Joint Information Board on Minerals and Derivatives. Pope Yeatman, in charge of the section of nonferrous metals of the War Industries Board, was made chairman, and Edson S. Bastin, of the division of mineral resources of the Geological Survey, executive secretary. The activities of the board have included meetings for the presentation of information concerning minerals of war importance and the discussion of administrative problems connected with the procuring of the necessary supplies of these minerals, the receipt of official inquiries relating to mineral information and the proper routing of such inquiries and the replies thereto, and the scrutiny of mineral questionnaires to be sent out by member organizations with a view to avoiding duplication. Files have been maintained containing much of the mineral information prepared in response to war requests, and a card index has been built up listing nearly all the mineral activities of the Government. There have been 13 meetings of the board up to June 30. Mimeographed copies of minutes of these meetings, recording fully the information presented, have been distributed to members of the board. Among the subjects covered were the following: Chrome ores and chrome alloys; manganese ores, manganese metallurgy, and manganese alloys; sulphur, pyrite, sulphuric acid; graphite; tin; asphalt and bitumen; tungsten, molybdenum, vanadium, and ferroalloys; clays; mica; quicksilver; fertilizers; also activities of various bureaus on minerals. Owing to changes in executive organizations and to changes in personnel within them, the board as now constituted is composed of 41 members, representing 36 divisions and bureaus in the following Government organizations: War, Navy, Agricultural, Commerce, Interior, Treasury, and State departments; War Industries, War Trade, and Shipping boards; Food, Fuel, and Railroad administrations; National Museum; Tariff Commission; Federal Trade Commission, and National Research Council. To meet the increase of secretarial work F. J. Katz, of the division of mineral resources, was assigned as assistant secretary.

Typical of additional statistical work undertaken by the division to meet war demands have been the inquiries relating to coal, copper, lead and zinc, and manganese.

Early in the year the Survey began the publication of weekly statements, prepared by C. E. Lesher, assisted by W. T. Thom, jr., of the production of bituminous coal and the factors in each district that are limiting production and shipment. At the request of the committee on coal production of the Council of National Defense, on October 17, the coal and coke statistical work of the division was coordinated with the statistical section of the United States Fuel Administration under a cooperative agreement between the Survey and the Fuel Administration, and the publication of weekly figures has been continued in charge of Mr. Lesher.

In addition to preparing the usual annual and semiannual reports on copper B. S. Butler began early in the year, at the request of the Council of National Defense, to collect by telegraph weekly statistics of the production of refined copper, stocks of refined copper, and sales of copper and distribute them to the war boards. Later Mr. Butler began the collection of monthly statistics of production and stocks of blister copper and monthly reports from the principal copper mines showing production and cause for any shortage of production.

At the request of the War Industries Board weekly telegraphic reports of smelter production, stocks, and commitments by classes of lead and zinc were obtained and compiled by C. E. Siebenthal. From these reports a weekly statement of the production and stocks of spelter by grades is made up and issued to the press and the industry; also, for the War Industries Board, a monthly statement of lead production and stocks of all classes and partial products is obtained by mail. Quarterly reports of lead and zinc production are also prepared by Mr. Siebenthal and published by the Survey, as well as the usual annual reports on lead, zinc, and cadmium.

During 1917 the importance of manganese in the war program and the difficulty of obtaining ships for imports created the demand for accurate, timely, and regular information concerning production from domestic deposits. Beginning in June, 1917, the annual canvass among manganese producers was supplemented by a quarterly inquiry, and since March, 1918, by monthly inquiry, under the supervision of D. F. Hewett. These inquiries have shown a steady increase in the rate of production of all grades of ore, as well as in the number of producers. This speeding up of manganese production may be mentioned as illustrating the increased activity in mining; although only 26,997 tons of high-grade manganese ore was produced in 1916, 28,345 tons was produced in the first half of 1917, 70,225 tons in 9 months, and 114,216 tons in 12 months, and reports from producers for the first quarter of 1918 show an output of 39,068 tons, with a prospect of 195,000 tons for the entire year. The lower grades show similar increases. Equally gratifying, as showing the interest in production, is the increase in the number of shippers of high-grade ore, from only 55 in 1916 to 133 in 1917. The number of manganese property owners to whom it has been necessary to send inquiries has increased from about 150 in 1916 to 1,200 in June, 1918.

The tremendous demand for cut steel in such forms as shells, large and small guns, and other metal articles used in the war has caused a great increase in the demand for information about tungsten, making it necessary for the Survey to collect much more information about deposits, ores, and their destinations and uses than heretofore, and this has been obtained by F. L. Hess, together with much additional information on the other ferroalloy metals, molybdenum, nickel, cobalt, vanadium, titanium, and zirconium. The national interest in molybdenum has been greater than ever before, and at the same time reliable data concerning uses and markets have been difficult to obtain, owing to the fact that control of consumption rests in a few hands and to the apparent mystery made of the uses. The demand for information about nickel has also been very large, owing to its general use in good steels other than tool steels, and closer touch has been kept with the industry than ever before.

Many deposits of tungsten and molybdenum were examined during the year, and hearings of the Tariff Commission concerning tungsten were attended at Denver on June 17, by Mr. Hess. Like tungsten and nickel, vanadium has become standard in many of the best steels, and naturally the inquiries for vanadium and for information about vanadium deposits have increased largely. Special uses for titanium have made it necessary to do a considerable amount of work upon the subject, and there has also been some inquiry for the other alloy metals, particularly cobalt.

In addition to the regular annual and semiannual reports on mineral production by the division of mineral resources, based on correspondence with approximately 110,000 mineral producers, the following investigations have been undertaken, largely for the information of Government organizations as a contribution to war work: Semiannual production of emery, corundum, and artificial abrasives, by F. J. Katz; weekly production and stocks of primary aluminum, and monthly production, stocks, and commitments of secondary aluminum (recovered scrap, etc.), by J. M. Hill; monthly production, stocks, and commitments of antimony metal, and weekly production of antimonial lead, by E. S. Bastin; monthly production and stocks of asphalt and bitumen, including petroleum tars, by J. D. Northrop; quarterly production and stocks of bromine, by R. W. Stone; monthly production, shipments, and stocks of chromite, by J. M. Hill; monthly mine output from principal copper mines, monthly production from copper smelters, monthly and weekly production and stocks of copper refineries, and weekly reports of copper-selling agents, by B. S. Butler; monthly and quarterly shipments and stocks of graphite, by H. G. Ferguson; weekly production, stocks, and commitments and monthly production and stocks from lead refineries, including antimonial lead, by C. E. Siebenthal; quarterly production and shipments of manganese ores by grades, and monthly shipments, beginning April, 1918, by D. F. Hewett; monthly production, stocks, and commitments of nickel, by F. L. Hess; monthly shipments, deliveries, and stocks of crude petroleum, by J. D. Northrop; monthly production, shipments, and stocks of pyrite, by P. S. Smith; quarterly production and stocks of quicksilver, by F. L. Ransome; monthly production, shipments, and stocks of sulphur, by P. S. Smith; quarterly production of tungsten ores, by F. L. Hess; and quarterly production and stocks, weekly production, stocks, and commitments of zinc smelters, by C. E. Siebenthal.

Work on Bulletin 666, "Our mineral supplies," was completed, with the exception of the last chapter and the introduction, by the mineral-resources specialists during the year, and the delay in completion was due only to the constant press of more urgent demands.

In addition to the many studies and reports for publication or for special war or industrial purposes, the members of the division have been called into innumerable conferences with other Government officials and representatives of the mineral industries on questions of national and even international importance. They have also served the public at large in the field and in the office by conference and by correspondence.

Cooperation between the Geological Survey and the State surveys in collecting most of the mineral statistics continued in force in the preparation of the report for 1917. The 17 States that cooperated were Alabama, Florida, Georgia, Illinois, Iowa, Maryland, Michigan, Minnesota, Missouri, New Jersey, New York, North Carolina, Oregon, Pennsylvania, Virginia, Washington, and Wisconsin. By this cooperation duplication by various organizations of a considerable amount of work is obviated, uniform and authoritative statistics are presented, and the producers are saved the annoyance of preparing several sets of statistical returns for the same purpose.

On June 30, 1918, the manuscripts of 22 chapters for the report for 1917 had been completed and transmitted to the printer. The reports on the several mineral products are prepared by the following persons:

Authors of chapters in Mineral Resources.

Author.	Subject.
E. S. Bastin	Antimony.
E. F. Burchard	Cement; fluorspar and cryolite; iron ore, pig iron, and steel.
B. S. Butler	Copper (general report); copper and silver in Michigan (mines report).
M. B. Clark	Mineral products of United States (summary) (with H. D. McCaskey).
J. S. Diller	Asbestos; chromite; talc and soapstone.
J. P. Dunlop	Silver, copper, lead, and zinc in the Central States, except Michigan (mines report); secondary metals; metals and ores (summary report); gold and silver (general report) (with H. D. McCaskey).
A. J. Ellis	Mineral waters.
H. G. Ferguson	Graphite.
H. S. Gale	Borax (with C. G. Yale); nitrates; potash (with W. B. Hicks).
C. N. Gerry	Gold, silver, copper, lead, and zinc in Idaho and Washington (mine reports).
V. C. Heikes	Gold, silver, copper, lead, and zinc in Arizona, Montana, Nevada, and Utah (mines reports).
C. W. Henderson	Gold, silver, copper, lead, and zinc in Colorado, New Mexico, South Dakota, Texas, and Wyoming (mines reports).
F. L. Hess	Cobalt, molybdenum, nickel, tantalum, tungsten, titanium, vanadium, uranium.
D. F. Hewett	Manganese and manganiferous ores.
W. B. Hicks	Potash salts (with H. S. Gale).
J. M. Hill	Aluminum and bauxite; barytes; platinum and allied metals; strontium ore; gold, silver, copper, lead, and zinc in the Eastern States (mines report).
F. J. Katz	Abrasives; feldspar; silica (quartz).
Adolph Knopf	Tin.
C. E. Lesher	Coal; fuel briquetting; the manufacture of coke; artificial gas.
G. F. Loughlin	Lime; slate; stone.
H. D. McCaskey	Gold and silver (general report) (with J. P. Dunlop); mineral products of the United States (summary report) (with M. B. Clark).
G. C. Martin	Gold, silver, and copper in Alaska.
Jefferson Middleton	Clay-working industries; fuller's earth; sand-lime brick.
J. D. Northrop	Asphalt and bituminous rock; natural gas; petroleum.
C. C. Osbon	Peat.
F. L. Ransome	Quicksilver.
C. E. Siebenthal	Lead, zinc, and cadmium (general report).
W. T. Schaller	Gems and precious stones; mica.
P. S. Smith	Sulphur, sulphuric acid, and pyrite.
R. W. Stone	Gypsum, magnesite (with C. G. Yale); magnesium; phosphate rock; sand and gravel; salt, bromine, and calcium chloride.
J. B. Umpleby	Arsenic, bismuth, selenium, and tellurium.
R. C. Wells	Sodium salts.
C. G. Yale	Borax (with H. S. Gale); magnesite (with R. W. Stone): gold, silver, copper, lead, and zinc in California and Oregon (mines report).

H. D. McCaskey, geologist in charge of the division, continued also in charge of the metals section and of the three offices of the division in the Western States; and G. F. Loughlin was designated and served throughout the year as geologist in charge of the nonmetals section of the division, succeeding E. F. Burchard.

The offices of the division at Denver, Salt Lake City, and San Francisco are under the direct charge of C. W. Henderson, V. C. Heikes, and C. G. Yale, respectively, who prepare the mine reports on gold, silver, copper, lead, and zinc in the Western States. They also act in cooperation with other members of the Survey, both in the field and in the office, and by keeping in close touch with the mining regions of the West they procure and disseminate much valuable information not readily obtained otherwise. These offices are therefore general Survey headquarters and bureaus of information in their respective regions. The Denver office, at 409 New Post Office Building, prepares the metal-mine reports for South Dakota, Wyoming, Colorado, and New Mexico; the Salt Lake City office, at 312 Post Office Building, covers in the same way the States of Montana, Idaho, Washington, Utah, Nevada, and Arizona; and the San Francisco office, at 305 Customhouse, is the headquarters for California and Oregon.

TOPOGRAPHIC BRANCH.

ORGANIZATION.

The fact that so many members have been selected for overseas duty has made necessary the temporary reorganization of the topographic branch. Since March 26, 1917, when military mapping was begun for the War Department, 110 members of this branch have received commissions in the Engineer Officers' Reserve Corps, ranging from second lieutenant to major; 66 of this number are either in France or have been selected for overseas duty and 7 are reporting direct to the Chief of Engineers.

The present assignments are as follows:

Chief geographer, Maj. R. B. Marshall.

Southeastern, northeastern, central, southern, and eastern departments, Maj. W. H. Herron and Maj. T. G. Gerdine, geographers, in charge.

Western department, G. R. Davis, geographer, in charge.

Inspectors of topography, Maj. W. M. Beaman, topographic engineer, in charge; Maj. A. M. Walker, topographic engineer, Capt. L. S. Leopold, topographer.

CIVILIAN PERSONNEL.

The civilian technical corps of the topographic branch was increased during the year by the reinstatement of 1 assistant topographer, the appointment of 7 new junior topographers and 22 draftsmen, the transfer of 3 draftsmen, and the temporary detail of 2 draftsmen from other branches. In addition to this, 2 geologists and 2 topographic engineers were transferred to this branch from other divisions for the period of the war. The technical force was reduced by the transfer of 1 draftsman, the resignation of 1 draftsman, 1 geologist, 1 assistant topographer, and 4 junior topographers, and the enlistment of 1 assistant topographer, 5 junior topographers, and 2 draftsmen. With those changes the corps now includes 5 geographers, 14 topographic engineers, 7 topographers, 13 assistant topographers, 10 junior topographers, and 33 draftsmen—a total of 82. In addition, 132 technical field assistants were employed during the whole or a part of the fiscal year. To assist with the military mapping 57 Engineer Reserve officers ranging in rank from second lieutenant to captain were detailed from the War Department to the topographic branch, and of this number 30 have been returned to the War Department. Two topographers, 3 junior topographers, and 1 clerk are on furlough. The clerical force comprises 15 clerks of various grades.

MILITARY PERSONNEL.

The following members of the topographic branch received commissions in the Engineer Officers' Reserve Corps prior to June 30, 1918:

Maj. J. W. Bagley.
Maj. W. M. Beaman.
Maj. C. H. Birdseye.
Maj. R. H. Chapman.
Maj. C. E. Cooke.
Maj. T. G. Gerdine.
Maj. W. H. Griffin.
Maj. G. T. Hawkins.
Maj. W. H. Herron.
Maj. J. H. Jennings.
Maj. R. B. Marshall.
Maj. Robert Muldrow.
Maj. A. C. Roberts.
Maj. G. S. Smith.
Maj. Frank Sutton.
Maj. A. M. Walker.
Maj. J. H. Wheat.
Capt. C. G. Anderson.
Capt. R. W. Berry.
Capt. Basil Duke.
Capt. A. T. Fowler.
Capt. C. E. Giffin.
Capt. E. G. Hamilton.
Capt. Duncan Hannegan.
Capt. J. P. Harrison.
Capt. A. F. Hassan.
Capt. R. M. Herrington (in cavalry, U. S. A.).
Capt. H. H. Hodgeson.
Capt. E. I. Ireland.
Capt. B. A. Jenkins.
Capt. C. B. Kendall.
Capt. L. L. Lee.
Capt. L. S. Leopold.
Capt. H. L. McDonald.
Capt. Frederick McLaughlin.
Capt. E. L. McNair.
Capt. W. L. Miller.
Capt. C. L. Nelson.
Capt. Albert Pike.
Capt. C. L. Sadler.
Capt. A. B. Searle.
Capt. J. G. Staack.
Capt. William Stranahan.
Capt. W. O. Tufts.
First Lieut. J. E. Blackburn.
First Lieut. A. O. Burkland.
First Lieut. G. C. Douglas.
First Lieut. J. R. Eakin.
First Lieut. R. T. Evans.
First Lieut. J. C. Fales.
First Lieut. C. R. Fisher.
First Lieut. S. P. Floore.
First Lieut. C. C. Gardner.
First Lieut. L. B. Glasgow.
First Lieut. E. L. Hain.
First Lieut. Charles Hartmann.
First Lieut. F. W. Hughes.

First Lieut. R. A. Kiger.
First Lieut. A. P. Meade, jr.
First Lieut. T. H. Moncure.
First Lieut. W. H. S. Morey.
First Lieut. Kostka Mudd.
First Lieut. O. H. Nelson.
First Lieut. A. J. Ogle.
First Lieut. S. T. Penick.
First Lieut. Roscoe Reeves.
First Lieut. R. H. Reineck.
First Lieut. T. F. Slaughter.
First Lieut. C. H. Semper.
First Lieut. D. H. Watson.
First Lieut. J. H. Wilson.
Second Lieut. N. E. Ballmer.
Second Lieut. W. C. F. Bastian.
Second Lieut. S. H. Birdseye.
Second Lieut. D. S. Birkett.
Second Lieut. E. W. Bowler.
Second Lieut. E. C. Burt.
Second Lieut. W. G. Carson.
Second Lieut. Howard Clark.
Second Lieut. R. G. Clinite.
Second Lieut. F. W. Crisp.
Second Lieut. F. A. Danforth.
Second Lieut. C. H. Davey.
Second Lieut. C. A. Ecklund.
Second Lieut. W. S. Gehres.
Second Lieut. C. C. Holder.
Second Lieut. A. J. Kavanagh.
Second Lieut. J. B. Leavitt.
Second Lieut. P. W. McMillen.
Second Lieut. J. B. Metcalfe, jr.
Second Lieut. R. R. Monbeck.
Second Lieut. Bishop Moorhead.
Second Lieut. A. L. Opdycke.
Second Lieut. S. L. Parker.
Second Lieut. T. P. Pendleton.
Second Lieut. J. M. Rawls.
Second Lieut. L. B. Roberts.
Second Lieut. M. A. Roudabush.
Second Lieut. C. W. Rowell.
Second Lieut. R. C. Seitz.
Second Lieut. H. E. Simmons.
Second Lieut. R. B. Steele.
Second Lieut. C. A. Stonesifer.
Second Lieut. O. G. Taylor.
Second Lieut. K. W. Trimble.
Second Lieut. W. B. Upton, jr
Second Lieut. C. W. Wardle.
Second Lieut. R. F. Wilcoxon.
Second Lieut. R. M. Wilson.
Second Lieut. B. H. Yoakum.

TRAINING SCHOOL FOR TOPOGRAPHERS.

On July 1, 1917, a training school for topographers was established in the vicinity of Washington for the purpose of training a force of field assistants sent here by engineering colleges throughout the country to acquire training in the rudiments of topographic engineering. About 75 candidates reported during the summer for training and were instructed for nearly a month each, after which they were distributed to topographic parties all over the country. On account of the operation of the selective draft, however, most of them enlisted in the Twenty-fifth and Twenty-ninth Engineers, and it has been found impracticable to reopen the school during the summer of 1918.

PUBLICATIONS.

The published work of the topographic branch for the fiscal year consists of 103 published maps, a photolithographic reprint of Crelle's Tables, and two bulletins (Nos. 651 and 654) giving results of spirit leveling in Nevada and Ohio. Bulletin 650, "Geographic tables and formulas," was reprinted with additions and corrections. Page proof has been reviewed for Bulletins 671, 672, 673, and 674, on spirit leveling in New York, Illinois, Kentucky, and Washington, respectively.

A translation from the French of the "Manual for the artillery orientation officer," containing a report of conferences held in the Army centers of instruction from November, 1916, to February, 1917, was made in collaboration with the United States Coast and Geodetic Survey and the Army War College.

ALLOTMENTS.

The total appropriations for topographic surveys for the fiscal year 1918 were:

Topographic surveys	$350,000
Surveying national forests	75,000
Statutory salaries	9,200
Special funds for military mapping (contributed by War Department)	500,000
Aviation photography	65,000
	999,200

COOPERATION.

Cooperation has been maintained in six States, which contributed the following amounts, with the understanding that they were to be used on military surveys:

California	$14,000
Illinois	7,000
Maine	5,000
Michigan	15,000
Virginia	4,500
Washington	10,500
	56,000

SUMMARY OF RESULTS.

Practically all the funds available for topographic mapping were allotted to areas selected by the War Department for special military surveys, and the sums contributed by the States for cooperation were done so with the understanding that they were to be used on these military surveys. The mapping of this class accomplished during the fiscal year amounted to 22,579 square miles, and detailed results are given by States in the reports of the several departments.

The contribution of this branch to war service is shown in Plate III.

As shown in the following tables, the total new area mapped was 21,955 square miles, making the total area surveyed to date in the United States 1,279,890 square miles, or 42.2 per cent of the entire country. In addition, 476 square miles of resurvey were completed, making the total area of surveys during the year 22,431 square miles.

In connection with these surveys, 7,945 linear miles of primary and precise levels were run, making 273,956 miles of primary and precise levels run since the authorization of this work by Congress in 1896.

SPECIAL WAR WORK ON—

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CONTRIBUTIO

In the course of this work 2,204 permanent bench marks were established.

Triangulation stations to the number of 58 were occupied, and 58 were permanently marked. Primary-traverse lines aggregating 7,676 miles were run, in connection with which 884 permanent marks were set.

Present condition of topographic surveys of the United States and new area surveyed July 1, 1917, to June 30, 1918.

	New area mapped July 1, 1917, to June 30, 1918.	Total area mapped to June 30, 1918.	Percentage of total area of State mapped to June 30, 1918.
	Square miles.	*Square miles.*	
Alabama	....	19,192	37
Arizona	....	70,136	62
Arkansas	....	21,494	40
California	2,890	122,508	77
Colorado	....	50,980	49
Connecticut	....	4,965	100
Delaware	310	2,370	100
District of Columbia	....	70	100
Florida	1,361	4,716	7
Georgia	2,600	21,507	36
Idaho	....	28,196	33
Illinois	849	16,795	29
Indiana	....	3,609	10
Iowa	....	11,916	21
Kansas	....	64,159	78
Kentucky	....	18,094	45
Louisiana	....	8,366	17
Maine	144	10,119	30
Maryland	12	12,327	100
Massachusetts	....	8,266	100
Michigan	887	9,085	15
Minnesota	....	7,354	9
Mississippi	....	2,126	4
Missouri	....	36,913	53
Montana	....	58,511	40
Nebraska	300	27,117	35
Nevada	....	51,141	46
New Hampshire	644	4,123	44
New Jersey	....	8,224	100
New Mexico	2,539	42,588	34
New York	....	44,663	91
North Carolina	159	18,549	35
North Dakota	....	9,814	14
Ohio	....	41,040	100
Oklahoma	....	39,908	57
Oregon	58	24,720	26
Pennsylvania	....	25,136	56
Rhode Island	....	1,248	100
South Carolina	3,706	9,346	30
South Dakota	....	19,032	25
Tennessee	....	21,283	50
Texas	2,408	73,384	28
Utah	....	69,025	82
Vermont	....	4,473	47
Virginia	2,350	34,334	80
Washington	729	30,054	43
West Virginia	....	24,170	100
Wisconsin	9	12,701	23
Wyoming	....	30,043	31
Total United States	21,955	1,279,890	42.2
Hawaii	....	1,393	....

GENERAL OFFICE WORK.

Results of computations for vertical and horizontal control were copied and catalogued.

The computations of control data were made principally by D. H. Baldwin, F. J. McMaugh, Oscar Jones, B. H. Yoakum, S. G. Lunde, G. T. Hawkins, C. F. Urquhart, E. C. Bebb, H. S. Senseney, E. L. McNair, Jacob Lenovitz, G. W. Hodgkins, R. H. Blain, C. R. Wingate, jr., Samuel Goldstein, D. T. McNair, A. W. Phelps, Harold Dewhirst, and W. E. Trimble, under the immediate supervision of E. M. Douglas, geographer. S. S. Gannett, geographer, was engaged in preparing manuscript and compiling data for bulletins submitted for publication, in miscellaneous computations, and in furnishing triangulation and leveling data for field and office use.

J. H. Renshawe, geographer, was engaged during the year in revising relief maps of the United States, in preparing relief maps of Ohio, southern California, aviation route from San Diego to Los Angeles, Pecatonica Flats (for use of Camp Grant cantonment), and the Balkan Peninsula; a poster for the Aviation Section, United States Navy; color schemes for use in aviation photography; and a chart showing contour construction for railroad cuts and fills, for the drafting division.

INSPECTION OF TOPOGRAPHIC MAPPING.

W. M. Beaman, assisted by L. S. Leopold, spent the entire year in the office in general supervision of the preparation of all results of military surveys for engraving, photolithography, or other reproduction. A. M. Walker assisted in this work from July to September, when he was selected for foreign service.

AERIAL PHOTOGRAPHIC SURVEYS.

Maj. J. W. Bagley, assisted by F. H. Moffit and for a part of the time by J. B. Mertie, was engaged during the year in designing and constructing photographic cameras to be used in connection with airplanes for making maps. This work was done under the direction of the Chief of Engineers, United States Army, and the Director of the Geological Survey. Sixteen engineer officers, most of whom are now at different aviation fields in this country, were trained in the use of these instruments, and about 40 enlisted men assisted them in mapping areas, which include among others the airplane mail route from Washington to New York and the airplane route from Washington to Langley Field, Va. Investigation of the problems arising in the use of the cameras is still in progress.

DRAFTING.

The compilation of the United States portion of the international map of the world, under the immediate supervision of A. F. Hassan, was discontinued in order that the drafting force might be utilized in drafting the military topographic maps for photolithographic reproduction. During the year the force was increased from 8 to 33 draftsmen.

In addition to 76 topographic maps which were completed during the year, 15 maps of motor-truck routes, 7 maps of air routes, and 4 French battle maps were prepared. Ten artillery-instruction diagrams, one sheet of British and French conventional signs, one drawing of the Lewis machine gun, and one drawing of an airplane camera were also prepared.

NORTHEASTERN DEPARTMENT.

FIELD WORK.

Summary.—During the season topographic mapping was carried on in Maine and New Hampshire. This work comprised the completion of the survey of 4 quadrangles and the resurvey of a portion of 1 quadrangle, in addition to which 3 quadrangles were partly surveyed. The total new area mapped was 788 square miles, for publication on the scale of 1:62,500, and the area resurveyed was 40 square miles, for publication on the same scale. In connection with this work 194 miles of primary levels were run and 45 permanent bench marks were established.

Topographic surveys in northeastern department from July 1, 1917, to June 30, 1918.

State.	Contour interval.	For publication on scale of 1:62,500.		Total area surveyed.	Primary levels.	
		New.	Resurvey.		Distance run.	Bench marks.
	Feet.	*Sq. miles.*	*Sq. miles.*	*Sq. miles.*	*Miles.*	
Maine	20	144	40	184	100	24
New Hampshire	20	644		644	94	21
		788	40	828	194	45

Maine.—For the continuation of cooperative topographic surveys in Maine the Public Utilities Commission allotted $5,000 and the United States Geological Survey allotted an equal amount, the amount necessary to complete the surveys being paid from Federal funds. The survey of the Cutler and Machias quadrangles, in Washington County, was completed, and that of the Columbia Falls quadrangle, in Washington County, was begun by W. H. Griffin, A. P. Meade, and J. F. McBeth, the total area mapped being 144 square miles, for publication on the scale of 1:62,500, with a contour interval of 20 feet. For the control of these areas S. R. Archer ran 100 miles of primary levels and established 24 permanent bench marks.

Maine-New Hampshire.—The resurvey of the York quadrangle, in York County, Maine, and Rockingham and Strafford counties, N. H., was continued by J. H. Wheat and G. W. Guerdrum, the total area resurveyed being 40 square miles, all in Maine, for publication on the scale of 1:62,500, with a contour interval of 20 feet.

New Hampshire.—The survey of the Alton and Mount Pawtuckaway quadrangles, in Rockingham, Strafford, and Belknap counties, N. H., was completed by Robert Muldrow, Hersey Munroe, A. T. Fowler, A. L. Opdycke, L. B. Roberts, A. J. Kavanagh, and P. W. McMillen, and that of the Gilmanton quadrangle, in Merrimack and Belknap counties, was continued by C. E. Cooke, A. C. Roberts, J. B. Metcalfe, and E. L. Bemis. The survey of the Suncook quadrangle, in Merrimack, Rockingham, and Hillsboro counties, was begun by Hersey Munroe and A. J. Kavanagh. The total area mapped was 644 square miles, for publication on the scale of 1:62,500, with a contour interval of 20 feet. For the control of these areas C. H. Semper ran 94 miles of primary levels and established 21 permanent bench marks.

OFFICE WORK.

The drafting of the following topographic maps was completed: Cutler and Machias, Me.

Progress in the drafting of additional sheets was made as follows: York, Maine-N. H., 90 per cent; Alton, N. H., 90 per cent; Gilmanton N. H., 80 per cent; Mount Pawtuckaway, N. H., 60 per cent.

Primary-level circuits were adjusted for the following quadrangles: Columbia Falls and Machias, Maine; Alton, Gilmanton, Mount Pawtuckaway, and Suncook, N. H.

Preliminary geographic positions were computed for the following quadrangles: Alton, Gilmanton, and Suncook, N. H.

EASTERN DEPARTMENT.

FIELD WORK.

Summary.—During the season topographic mapping was carried on in Delaware, Maryland, and Virginia. This work included the completion of the survey of 15 quadrangles and of the resurvey of 2 quadrangles, in addition to which 10 quadrangles and 1 special area were partly surveyed and 1 special area was completed. In addition to this work, the map of an area covering 227 square miles in Virginia was revised. The total new area mapped was 2,672 square miles, 2,660 square miles for publication on the scale of 1:62,500, and 12 square miles on the scale of 1:4,800. The area resurveyed was 376 square miles for publication on the scale of 1:62,500, 26 square miles for publication on the scale of 1:10,000, and 34 square miles for publication on the scale of 1:20,000, making a total of 436 square miles resurveyed. In connection with this work 1,571 miles of primary levels were run, 626 permanent bench marks were established, 1,242 miles of primary traverse were run, and 315 permanent marks were set.

Topographic surveys in eastern department from July 1, 1917, to June 30, 1918.

State.	Contour interval.	For publication on scale of—					Total area surveyed.	Primary levels.		Primary traverse.	
		1:62,500		1:4,800 (new).	1:10,000 (resurvey).	1:20,000 (resurvey).		Distance run.	Bench marks.	Distance run.	Permanent marks.
		New.	Resurvey.								
	Feet.	*Sq. mi.*	*Sq. mi.*	*Sq. mi.*	*Sq. mi.*	*Sq. mi.*	*Sq. mi.*	*Miles.*		*Miles.*	
Delaware......	10	310	....	....	....	....	310	....	....	....	....
Maryland......	3, 10	....	16	12	....	....	28	106	218	76	138
Virginia.......	5, 10, 20 1 meter 5 meters	2,350	360	....	26	34	2,770	1,465	408	1,166	177
	....	2,660	376	12	26	34	3,108	1,571	626	1,242	315

Delaware.—The survey of the Cape Henlopen, Cedar Creek, and Rehoboth quadrangles, in Kent and Sussex counties, Del., was completed by C. E. Cooke, W. H. Griffin, A. B. Searle, A. P. Meade, jr., J. F. McBeth, S. P. Floore, R. A. Kiger, F. W. Crisp, and S. H. Birdseye, the total area mapped being 310 square miles, for publication on the scale of 1:62,500, with a contour interval of 10 feet.

Delaware-Maryland.—The resurvey of the Maryland portion of the Harrington quadrangle, in Caroline County, was completed by A. B. Searle, the area mapped being 16 square miles, for publication on the scale of 1:62,500, with a contour interval of 10 feet.

Maryland.—The survey of the Gunpowder Neck filling plant, in Harford County, Md., was begun by J. G. Staack, C. E. Cooke, Fred McLaughlin, A. B. Searle, W. J. Lloyd, L. S. Leopold, K. W. Trimble, Pearson Chapman, J. H. Wilke, R. M. Herrington, S. H. Birdseye, C. A. Stonesifer, C. C. Holder, T. P. Pendleton, and J. L. Lewis, the total area mapped being 12 square miles, for publication on the scale of 1:4,800. For the control of this area S. H. Birdseye and H. S. Senseney ran 106 miles of primary levels and established 218 permanent bench marks, and C. F. Urquhart ran 76 miles of primary traverse and set 138 permanent marks.

Virginia.—For the continuation of cooperative topographic surveys in Virginia the State geologist allotted $4,500 and the United States Geological Survey an equal amount, the amount necessary to complete the surveys being paid from Federal funds. The survey of the New Kent, Doswell, King William, Disputanta, Smithfield, Charles City, Aylett, Toano, Tappahannock, and Surry quadrangles, in King and Queen, King William, New Kent, Essex, Middlesex, Caroline, Hanover, Prince George, Sussex, Surry, Henrico, Charles City, James City, Richmond, Westmoreland, Nansemond, and Isle of Wight counties, was completed, and that of the Homeville, Jarratt, McKenney, Ivor, and Lawrenceville quadrangles, in Isle of Wight, Brunswick, Nottoway, Dinwiddie, Surry, Sussex, Southampton, and Greenesville counties, was begun by A. T. Fowler, Fred McLaughlin, Duncan Hannegan, J. I. Gayetty, F. W. Hughes, C. H. Davey, C. S. Wells, J. M. Whitman, W. K. McKinley, J. H. Wilke, W. J. Lloyd, Olinus Smith, W. H. S. Morey, P. W. McMillen, U. S. Grant, E. I. Ireland, T. F. Slaughter, E. M. Levy, Basil Duke, R. W. Burchard, J. E. Blackburn, E. M. Bandli, H. A. Bean, C. D. S. Clarkson, J. J. Charters, H. E. Simmons, H. L. McDonald, J. J. Phelan, Bishop Moorhead, E. E. Harris, H. J. Gilkey, C. B. Holmes, R. L. Harrison, and C. M. Madden, the total area mapped being 1,819 square miles, for publication on the scale of 1:62,500, with contour intervals of 10 and 20 feet. The resurvey of the Cape Henry and Newport News quadrangles, in Princess Anne, Norfolk, Elizabeth City, Warwick, and Nansemond counties, was completed by R. H. Sargent, H. M. Eakin, Mark Noble, H. C. O. Clarke, B. W. Brown, R. C. Seitz, A. J. Kavanagh, T. F. Murphy, Hersey Munroe, and E. V. Perkinson, the area resurveyed being 360 square miles, for publication on the scale of 1:62,500. In addition to this work J. I. Gayetty revised the map of the Disputanta quadrangle, the area covered being 227 square miles. For the control of these areas E. E. Harris, S. R. Archer, C. R. French, H. J. Switzer, S. L. Parker, and A. C. Schilling ran 826 miles of primary levels and established 213 permanent bench marks, and J. J. Charters, J. C. Fales, R. L. Bennett, A. C. Schilling, H. J. Switzer, J. J. Phelan, and F. J. McMaugh ran 628 miles of primary traverse and set 72 permanent marks.

In addition to this work the resurvey of the Mulberry Island special area (which covers a portion of the Yorktown quadrangle), in Warwick County, was completed by H. C. O. Clarke, E. V. Perkinson, C. D. S. Clarkson, H. E. Simmons, J. L. Lewis, A. L. Ackers, A. J. Kavanagh, R. W. Burchard, B. W. Brown, R. L. Harrison, Bishop Moorhead, A. B. Searle, E. M. Bandli, F. L. Whaley, J. M. Whitman, Cornelius Schnurr, J. J. Charters, and W. R. Chenoweth, the total area resurveyed being 60 square miles, 26 square miles for publication on the scale of 1:10,000 and 34 square miles for publication on the scale of 1:20,000. For the control of this special area E. E. Harris, S. L. Parker, A. C. Schilling, and R. B. Steele ran 152 miles of primary levels and established 81 permanent bench marks, and J. J. Charters, J. C. Fales, and J. J. Phelan ran 107 miles of primary traverse and set 67 permanent marks.

Virginia-North Carolina.—The survey of the Suffolk quadrangle, in Nansemond County, Va., and Gates County, N. C., was completed and that of the Elwood, Emporia, White Plains, Arringdale, and Boykins quadrangles, in Southampton, Greenesville, Sussex, Nansemond, Isle of Wight, and Brunswick counties, Va., and Hertford, Gates, Northampton, Warren, and Halifax counties, N. C., was begun by Fred McLaughlin, A. L. Ackers, C. E. Bardsley, W. R. Chenoweth, M. J. Gleissner, R. F. Wilcoxon, G. C. Douglas, C. F. Merten, E. L. Marek, G. B. Davidson, R. W. Berry, Cornelius Schnurr, J. M. Whitman, Duncan Hannegan, F. L. Whaley, and A. C. Schilling, the total area mapped being 690 square miles, of which area 531 square miles lies in Virginia and 159 square miles in North Carolina. For the control of these areas E. E. Harris, J. C. Fales, C. R. French, and R. B. Steele ran 487 miles of primary levels and established 114 permanent bench marks, and H. J. Switzer, J. J. Phelan, J. C. Fales, and R. L. Bennett ran 431 miles of primary traverse and set 38 permanent marks.

OFFICE WORK.

The drafting of the following topographic maps was completed: Cape Henlopen, Cedar Creek, Harrington, Millsboro, and Rehoboth, Del.; vicinity of Edgewood, Gunpowder Neck Canal Creek, Gunpowder Neck Cantonment Site, Md.; Aylett, Charles City, Disputanta, Doswell, New Kent, Surry, Tappahannock, and Toano, Va.

Progress in the drafting of additional sheets was made as follows: Gunpowder Neck, Md., 35 per cent; King William, Va., 90 per cent; Newport News, Va., 25 per cent; Mulberry Island, Va., 1:10,000, 10 per cent; Mulberry Island, Va., 1:20,000, 35 per cent.

Primary-level circuits were adjusted for the following quadrangles: Cape Henlopen, Cedar Creek, Harrington, Millsboro, and Rehoboth, Del.; Aylett, Arringdale, Boydton, Boykins, Cape Henry, Doswell, Elwood, Emporia, Homeville, Ivor, Jarratt, King William, Lawrenceville, McKenney, New Kent, Newport News, Smithfield, South Hill, Suffolk, Tappahannock, and Yorktown, Va.

Geographic positions were computed for the following quadrangles: Gunpowder Neck, Md.; Arringdale, Boykins, Cape Henry, Elwood, Emporia, Homeville, Isle of Wight, Ivor, Jarratt, Lawrenceville, McKenney, Newport News, Smithfield, South Hill, Suffolk, White Plains, Williamsburg, and Yorktown, Va.

SOUTHEASTERN DEPARTMENT.

FIELD WORK.

Summary.—During the year topographic mapping was carried on in Florida, Georgia, North Carolina, and South Carolina. This work included the completion of the survey of 35 quadrangles, in addition to which 20 quadrangles were partly surveyed. The total new area mapped was 7,826 square miles, 7,010 for publication on the scale of 1:62,500 and 816 square miles for publication on the scale of 1:21,120. In connection with this work 3,509 miles of primary levels and 423 miles of precise levels were run and 1,000 permanent bench marks established.

Primary traverse was carried on by six parties in Georgia, North Carolina, and South Carolina, 4,697 miles being run and 346 marks being set. This work made control available in 98 quadrangles.

Topographic surveys in southeastern department from July 1, 1917, to June 30, 1918.

State.	Contour interval.	For publication on scale of—		Total area surveyed.	Levels.			Primary traverse.	
		1:62,500 (new).	1:21,120 (new).		Primary.	Precise.	Bench marks.	Distance run.	Permanent marks
		Sq. m.	*Sq. m.*	*Sq. m.*	*Miles.*	*Miles.*		*Miles.*	
Florida	10	1,361	....	1,361	228	....	27	....	....
Georgia	10	2,600	....	2,600	1,616	274	485	2,167	154
North Carolina	10	159	....	159	....	....	....	44	3
South Carolina	5,10,20	2,890	816	3,706	1,670	149	488	2,486	189
	....	7,010	816	7,826	3,509	423	1,000	4,697	346

Florida.—The survey of the Palm Valley, Orange Park, Middleburg, Mayport, Jacksonville, Hilliard, and Cambon quadrangles, in Nassau, Duval, St. Johns, and Clay counties, Fla., was completed by J. H. Jennings, W. L. Miller, Fred Graff, jr., Gilbert Young, Horace Raynor, M. A. Roudabush, C. W. Wardle, J. B. Leavitt, W. S. Gehres, C. L. Sadler, O. G. Taylor, R. M. Herrington, C. W. Stump, jr., G. R. Richardson, R. L. Harrison, J. C. Hilliard, C. W. Goodlove, and H. R. Kilmer, the total area mapped being 927 square miles, for publication on the scale of 1 : 62,500, with a contour interval of 10 feet. For the control of the Hilliard quadrangle S. L. Parker ran 120 miles of primary levels and established 13 permanent marks.

Florida-Georgia.—The survey of the Kingsland, Folkston, Boulogne, St. Marys, Fernandina, Moniac, and Macclenny quadrangles, in Nassau and Baker counties, Fla., and Camden, Charlton, and Ware counties, Ga., was completed by R. L. Harrison, J. A. Duck, F. W. Farnsworth, E. J. Essick, C. W. Stump, jr., C. W. Goodlove, H. R. Kilmer, R. M. Herrington, J. C. Hilliard, R. B. Turner, E. S. Huntley, Horace Roberts, F. L. Shalibo, Montague Blundon, G. F. Brockman, William Soaper, jr., C. L. Sadler, and O. G. Taylor, the total area mapped being 1,175 square miles, for publication on the scale of 1 : 62,500, with a contour interval of 10 feet. For the control of these areas R. G. Clinite ran 146 miles of primary levels and established 24 permanent marks.

Georgia.—The survey of the Nahunta, Jesup, Hinesville, and Cumberland Island quadrangles, in Camden, Pierce, Glynn, Wayne, and Liberty counties, Ga., was completed and that of the Millen, Stellaville, Spread, Register, Brooklet, Glennville, Daisy, Rocky Ford, Dearing, Appling, Hephzibah, Sylvania, and Egypt quadrangles, in Richmond, Columbia, Burke, Screven, Bulloch, Effingham, Jenkins, Jefferson, Warren, McDuffie, Glascock, Emanuel, Liberty, Tattnall, and Bryan counties, was begun by C. W. Goodlove, E. J. Essick, J. A. Duck, J. H. Jennings, J. M. Rawls, W. F. Hicks, Albert Pike, L. L. Lee, Gilbert Young, James Dolan, R. L. Harrison, A. L. Opdycke, W. L. Miller, T. F. Slaughter, Olinus Smith, F. W. Hughes, W. D. Lewis, C. L. Sadler, M. A. Roudabush, W. C. F. Bastian, E. K. Nelson, F. W. Look, C. C. Gardner, G. F. Brockman, R. D. Cummins, C. W. Rowell, W. C. Perkins, Horace Roberts, J. W. Lewis, W. W. Keeler, J. F. McCook, W. H. Griffin, A. P. Meade, jr., J. F. McBeth, R. L. McCammon, and S. T. Penick, the total area mapped being 1,649 square miles, for publication on the scale of 1:62,500, with a contour interval of 10 feet. For the control of these areas and of the Bascom, Meldrim, Pembroke, Wadley, and Rosier quadrangles L. F. Biggs, D. S. Birkett, S. R. Archer, R. F. Creson, jr., C. H. Semper, H. P. Kilby, R. G. Clinite, and H. S. Senseney ran 1,353 miles of primary levels and established 385 permanent bench marks and C. H. Semper ran 195 miles of precise levels. In addition to this, for the control of these areas and that of the Macon, Gordon, Meriwether, Hazelhurst, Elliott, Altamaha, Davisboro, Sandersville, Dublin, Warthen, Gibson, Vidalia, Swainsboro, Sparta, Cobbtown, Milledgeville, Reidsville, Warrenton, Stillmore, Garfield, Dates, and Wrightsville quadrangles, E. L. McNair, Oscar Jones, and G. T. Hawkins ran 1,936 miles of primary traverse and set 142 permanent marks.

North Carolina.—(See Virginia-North Carolina.)

South Carolina.—The survey of the Yemassee, Green Pond, Walterboro, Edisto Island, Cottageville, Cummings, Varnville, Olar, and Pineland quadrangles, and the west half of the Ravenels and Wadmela Island quadrangles, in Hampton, Colleton, Barnwell, Bamburg, Beaufort, Charleston, and Dorchester counties, S. C., was completed, and that of the Montmorenci, Talatha, and Allendale quadrangles, in Aiken, Edgefield, and Barnwell counties, was begun by C. E. Cooke, Gilbert Young, R. B. Turner, F. E. Smith, J. H. Wilke, Harry Aid, W. S. Beames, W. G. Sloan, Robert Muldrow, W. H. S. Morey, Montague Blundon, E. S. Huntley, C. W. Goodlove, H. R. Kilmer, C. W. Wardle, Horace Roberts, H. D. Clement, C. E. Crook, David Adams, E. V. Holloway, C. C. Shepard, F. W. Farnsworth, G. F. Brockman, C. B. Moore, W. K. McKinley, E. J. Francis, W. H. Griffin, A. P. Meade, jr., J. F. McBeth, R. L. McCammon, W. L. Miller, W. J. Nolte, J. M. Rawls, G. H. Guerdrum, and T. F. Slaughter,

the total area mapped being 2,638 square miles, for publication on the scale of 1 : 62,500, with a contour interval of 10 feet. In addition to this, the survey of the Sewee Bay, Capers Island, Bulls Island, Fort Moultrie, Melgrove, Charleston, James Island, Birdkey, Legareville, Kiawah Island, Ladson, Stono, and Wando 7½-minute quadrangles, in Charleston and Berkeley counties, was completed by J. H. Jennings, W. K. Wood, Angus MacManus, Fred Graff, jr., W. B. Upton, jr., C. B. Childs, J. J. Murphy, E. B. Hill, C. L. Wade, J. F. McCook, James Dolan, C. W. Stump, jr., E. H. Stelle, R. D. Cummin, and J. C. Hilliard, the total area surveyed being 816 square miles, for publication on the scale of 1 : 21,120, with a contour interval of 5 feet. For the control of these areas and of the Chicora, Lodge, Bamberg, Talatha, Santee, Georgetown, Waverly Mills, St. George, Bonneau, Kingstree, Okatie, Moncks Corner, Awensdaw, Trio, Ridgeville, Summerville, and Fort Fremont quadrangles H. S. Senseney, C. W. Stump, jr., H. L. Hudson, F. L. Shalibo, R. G. Clinite, D. S. Birkett, H. D. Clement, C. H. Semper, and P. W. McMillen ran 1,433 miles of primary levels and established 403 permanent bench marks and C. H. Semper ran 107 miles of precise levels.

In addition to this, for the control of these areas and of the Scranton, Kingstree, Branchville, Lodge, Ridgeville, Bowman, Bamberg, Williston, Woodford, Seivern, Edmund, Lexington, Batesburg, and Edgefield quadrangles, E. L. McNair, R. F. Creson, jr., B. H. Yoakum, H. S. Senseney, and Oscar Jones ran 2,178 miles of primary traverse and set 166 permanent marks.

Georgia-South Carolina.—The survey of the Shirley quadrangle, in Hampton County, S. C., and Effingham and Screven counties, Ga., was completed, and that of the Greens Cut, Peeples, Augusta, and Warrenville quadrangles, in Aiken and Hampton counties, S. C., and Richmond, Burke, and Screven counties, Ga., was begun by Gilbert Young, C. E. Crook, David Adams, F. E. Smith, E. H. Stelle, R. B. Turner, C. L. Sadler, E. K. Nelson, B. H. Yoakum, R. A. Mafit, P. W. McMillen, Robert Muldrow, W. K. McKinley, and C. B. Moore, the total area mapped being 462 square miles, for publication on the scale of 1:62,500, with a contour interval of 10 feet. For the control of these areas and of the Robbins, Clarks Hill, Savannah, and Hardeeville quadrangles C. H. Semper, D. S. Birkett, L. F. Biggs, F. L. Shalibo, R. F. Creson, jr., and H. L. Hudson ran 457 miles of primary levels and established 175 permanent bench marks, C. H. Semper ran 121 miles of precise levels, and E. L. McNair, B. H. Yoakum, H. S. Senseney, and Oscar Jones ran 539 miles of primary traverse and set 35 permanent marks.

OFFICE WORK.

The drafting of the following sheets was completed: Cambon, Jacksonville, Lawtey, Mayport, Middleburg, Orange Park, and Palm Valley, Fla.; Boulogne, Fernandina, Folkston, Hilliard, Kingsland, Macclenny, and Moniac, Fla.-Ga.; Bladen, Cumberland Island, Everett City, Hinesville, Hortense, Jesup, and Nahunta, Ga.; Cottageville, Walterboro, Yemassee, and Varnville, S. C.

Progress in the drafting of additional sheets was made as follows: St. Marys, Fla.-Ga., 65 per cent; Green Pond, S. C., 20 per cent; Edisto Island, S. C., 20 per cent.

Primary-level circuits were adjusted for the following quadrangles: Cambon, Hilliard, Jacksonville, Lawtey, Middleburg, and St. Marys, Fla.; Bladen, Everett City, and Moniac, Ga.; Boulogne and Macclenny, Ga.-Fla.; Charleston, Cottageville, Edisto Island, Fort Fremont, Green Pond, Hardeeville, Okatie, Ravenels, Varnville, Walterboro, and Yemassee, S. C.

Geographic positions were computed for the following quadrangles: Ates Creek, Jacksonville, Mayport, Middleburg, Orange Park, and St. Marys, Fla.; Agricola, Appling, Bascom, Broxton, Cobbtown, Coffee, Daisy, Dates, Dearing, Davisboro, Egypt, Folkston, Garfield, Glennville, Greens Cut, Hephzibah, Meldrim, Milledgeville, Millen, Moniac, Nahunta, Offerman, Pembroke, Register, Reidsville, Rocky Ford, Rosier, Sessoms, Sandersville, Spread, Stellaville, Sylvania, Wadley, Wilcox, Winokur, and Wrightsville, Ga.; Boulogne, Fla.-Ga.; Savannah, Ga.-S. C.; Halifax and Potecasi, N. C.; Allendale, Awendaw, Bulls Island, Bonneau, Charleston, Cottageville, Chicora, Cummings, Egypt, Georgetown, Green Pond, Johns Island, Moncks Corner, Montmorenci, Okatie, Olar, Pineland, Ravenels, Ridgeville, Santee, Summerville, Talatha, Trio, Varnville, Waverly Mills, Walterboro, Williston, and Yemassee, S. C.; Augusta, Clarks Hill, Hardeeville, Peeples, Robbins, Shirley, and Warrenville, S. C.-Ga.

CENTRAL DEPARTMENT.

FIELD WORK.

Summary.—During the season topographic mapping was carried on in Illinois, Michigan, Nebraska, and Wisconsin. The work included the completion of the survey of 8 quadrangles and 1 special area. The total new area mapped was 2,045 square miles, 1,745 square miles for publication on the scale of 1:62,500, 24 square miles for publication on the scale of 1:10,000, and 276 square miles for publication on the scale of 1:20,000. In connection with this work 750 miles of primary levels were run and 188 permanent bench marks were established.

Primary traverse was carried on by three parties in Illinois, Michigan, and Nebraska and covered 2,488 square miles, 822 miles being run and 95 permanent marks set. The result of this work was to make control available in 10 quadrangles and 1 special area.

Topographic surveys in central department from July 1, 1917, to June 30, 1918.

State.	Contour interval.	For publication on scale of—			Total area surveyed.	Primary levels.		Primary traverse.	
		1:62,500 (new).	1:10,000 (new).	1:20,000 (new).		Distance run.	Bench marks.	Distance run.	Permanent marks.
	Feet.	*Sq. mi.*	*Sq. mi.*	*Sq. mi.*	*Sq. mi.*	*Miles.*		*Miles.*	
Illinois	20	849	....	....	849	261	57	241	24
Michigan	20	887	....	....	887	279	76	339	25
Nebraska	10	....	24	276	300	210	55	242	46
Wisconsin	20	9	....	....	9	....	....	....	....
	....	1,745	24	276	2,045	750	188	822	95

Illinois.—The governor of Illinois allotted $7,000 for the continuation of cooperative topographic surveys, and the United States Geological Survey allotted an equal amount, the amount necessary to complete the surveys being paid from Federal funds. The survey of the Kings and Kirkland quadrangles, in Ogle, Winnebago, Dekalb, and Boone counties, was completed by J. G. Staack, R. H. Reineck, S. T. Penick, T. F. Slaughter, J. A. Duck, C. C. Gardner, A. L. Opdycke, C. C. Holder, and J. B. Leavitt, the total area mapped being 442 square miles, for publication on the scale of 1:62,500, with a contour interval of 20 feet. For the control of these quadrangles Fred Crisp ran 132 miles of primary traverse and set 12 permanent marks; S. L. Parker, C. C. Holder, and F. A. Danforth ran 80 miles of primary levels and established 22 permanent bench marks in the Kings quadrangle; and C. C. Gardner and H. S. Senseney ran 24 miles of primary levels and established 5 permanent marks in the Kirkland quadrangle.

Illinois-Wisconsin.—The survey of the Belvidere and Rockford quadrangles, mainly in Boone and Winnebago counties, Ill., was completed, the total area mapped being 416 square miles, for publication on the scale of 1:62,500, with a contour interval of 20 feet. Of this area 9 square miles is in Wisconsin. For the control of these areas Fred Crisp ran 109 miles of primary traverse and set 12 permanent marks, all in Illinois. For the control of the Rockford quadrangle C. H. Semper ran 82 miles of primary levels and established 12 permanent bench marks, and for the control of the Belvidere quadrangle C. H. Semper, H. S. Senseney, and S. L. Parker ran 75 miles of primary levels and established 18 permanent marks.

Michigan.—For the continuation of cooperative topographic surveys in Michigan the State geologist allotted $15,000 and the United States Geological Survey allotted an equal amount, the amount necessary to complete the surveys being paid from Federal funds. The survey of the Battle Creek, Union City, Galesburg, and Leonidas quadrangles, in Kalamazoo, Barry, Calhoun, Branch, Eaton, and St. Joseph counties was completed by C. L. Sadler, E. I. Ireland, Duncan Hannegan, J. I. Gayetty, J. M. Whitman, S. P. Floore, Olinus Smith, F. W. Hughes, C. S. Wells, J. M. Rawls, R. A. Kiger, M. A. Roudabush, R. R. Monbeck, S. H. Birdseye, G. H. Guerdrum, F. W. Farnsworth, C. H. Davey, E. J. Essick, P. W. McMillen, W. F. Hicks, W. K. McKinley, J. C. Hilliard, and E. E. Harris, the area mapped being 887 square miles, for publication on the scale of 1:62,500, with a contour interval of 20 feet.. For the control of these areas and of the Marshall and Homer quadrangles Oscar Jones and H. S. Senseney ran 339 miles of primary traverse and set 25 permanent marks. For the control of the Battle Creek, Galesburg, Leonidas, and Union City quadrangles S. L. Parker, R. R. Monbeck, C. H. Davey, A. O. Burkland, E. E. Harris, and W. S. Gehres ran 279 miles of primary levels and established 76 permanent marks.

Nebraska.—The survey of the Omaha balloon field, in Washington and Douglas counties, Nebr., was completed by C. E. Cooke, C. L. Sadler, J. G. Staack, C. C. Holder, M. A. Roudabush, S. T. Penick, R. M. Herrington, A. L. Opdycke, F. W. Hughes, J. A. Duck, Olinus Smith, C. C. Gardner, C. S. Wells, P. W. McMillen, J. W. Lewis, E. L. Goldsmith, W. D. Lewis, E. K. Nelson, F. W. Look, E. J. Francis, Percy Lyons, and W. C. F. Bastian, the area surveyed being 276 square miles for publication on the scale of 1:20,000 and 24 square miles for publication on the scale of 1:10,000, with a contour interval of 10 feet. For the control of this area Oscar Jones ran 242 miles of primary traverse and set 46 permanent marks, and H. S. Senseney S. R. Archer, S. H. Birdseye, and P. W. McMillen ran 210 miles of primary levels and established 55 permanent bench marks.

OFFICE WORK.

The drafting of the following topographic maps was completed: Kings and Kirkland, Ill.; Belvidere and Rockford, Ill.-Wis.; Battle Creek, Galesburg, Leonidas, and Union City, Mich.; Fort Omaha, 1:10,000, Nebr.

Progress in the drafting of additional sheets was made as follows: Golconda, Ky.-Ill., 85 per cent; Fort Omaha, 1:20,000, Nebr., 95 per cent.

Primary-level circuits were adjusted for the following quadrangles: Belvidere, Kings, Kirkland, and Rockford, Ill.; Battle Creek, Galesburg, Leonidas, and Union City, Mich.; Arlington, Blair, Calhoun, Elkhorn, Florence, Irvington, and Kennard, Nebr.

Geographic positions were computed for the following quadrangles: Belvidere, Kings, Kirkland, Oregon, and Rockford, Ill.; Battle Creek, Galesburg, Homer, Leonidas, Schoolcraft, Union City, and

Vermontville, Mich.; Arlington, Ascot, Blair Calhoun, Chalco, Elkhorn, Florence, Honey Creek, Irvington, Kennard, Omaha, Ralston, and Waterloo, Nebr.

SOUTHERN DEPARTMENT.

FIELD WORK.

Summary.—During the season topographic mapping was carried on in New Mexico and Texas. The work included the completion of the survey of 24 quadrangles. The total new area mapped was 4,947 square miles, for publication on the scale of 1:62,500, with contour intervals of 10, 25, and 50 feet. In connection with this work 583 miles of primary levels were run and 174 permanent bench marks were established.

Primary triangulation was carried on by two parties in New Mexico, 25 stations being occupied and 25 marked. The total area covered by this work was about 1,802 square miles. This work made control available in 22 quadrangles.

Topographic surveys in southern department from July 1, 1917, to June 30, 1918.

State.	Contour interval.	For publication on scale of 1:62,500 (new).	Primary levels.		Triangulation.	
			Distance run.	Bench marks.	Stations occupied.	Stations marked.
	Feet.	*Sq. miles.*	*Miles.*			
New Mexico	10, 25	2,539	308	94	17	17
Texas	50	2,408	275	80	8	8
		4,947	583	174	25	25

New Mexico.—The survey of the Playas, Pratt, Animas Peak, Walnut Wells, Hachita, and Big Hatchet Peak quadrangles and of the New Mexico portion of the Victorio, Noria, Antelope Wells, Cienega Springs, and Dog Mountains quadrangles (lying partly in Mexico), in Grant, Dona Ana, and Luna counties, N. Mex., was completed by J. G. Staack, J. E. Blackburn, R. H. Reineck, H. L. McDonald, R. W. Burchard, C. E. Giffin, J. L. Lewis, W. R. Chenoweth, G. C. Douglas, C. C. Gardner, F. A. Danforth, E. M. Bandli, F. L. Whaley, R. F. Wilcoxon, R. B. Steele, A. C. Williams, A. L. Ackers, Bishop Moorhead, C. E. Bardsley, H. J. Gilkey, C. F. Merten, E. M. Levy, E. P. Asbury, and C. B. Holmes, the total area mapped being 2,445 square miles, for publication on the scale of 1:62,500, with contour intervals of 10 and 25 feet. Of these areas, portions of the Cienega Springs, Antelope Wells, Walnut Wells, and Animas Peak quadrangles, a total area of 141 square miles, lie in the Chiricahua National Forest. For the control of these areas R. W. Burchard and R. B. Steele ran 308 miles of primary levels and established

94 permanent bench marks, and G. T. Hawkins and B. H. Yoakum occupied 17 triangulation stations, all of which they marked permanently.

New Mexico–Texas.—The survey of the New Mexico and Texas portions of the Canutillo quadrangle (lying partly in Mexico), in Dona Ana County, N. Mex., and El Paso County, Tex., was completed by C. E. Giffin, Bishop Moorhead, C. W. Wardle, H. L. McDonald, J. L. Lewis, and W. R. Chenoweth, the total area mapped being 222 square miles (128 in Texas and 94 in New Mexico), for publication on the scale of 1:62,500, with a contour interval of 10 feet.

Texas.—The survey of the Buck Hill, Jordan Gap, Hood Spring, Santiago Peak, Nine Point Mesa, Bone Spring, Indian Wells, Bullis Gap, Dove Mountain, and Maravillas Canyon quadrangles and of the Texas portion of the Reagan Canyon and Dryden Crossing quadrangles (lying partly in Mexico), in Brewster, Presidio, and Terrell counties, Tex., was completed by Basil Duke, C. G. Anderson, B. H. Yoakum, H. E. Simmons, R. H. Reineck, R. W. Berry, H. B. Ingersoll, R. F. Wilcoxon, Gustave Peters, D. S. Birkett, R. H. Runyan, R. L. Harrison, Cornelius Schnurr, S. G. Lunde, H. H. Hodgeson, O. H. Nelson, A. O. Burkland, R. R. Monbeck, S. T. Penick, C. C. Holder, Howard Clark, G. R. Smith, and S. P. Hayes, the total area mapped being 2,280 square miles, for publication on the scale of 1:62,500, with a contour interval of 50 feet. For the control of these areas D. S. Birkett ran 275 miles of primary levels and established 80 permanent bench marks, and J. R. Ellis occupied 8 triangulation stations, all of which he marked permanently.

OFFICE WORK.

The drafting of the following topographic maps was completed: Perilla, Verde River, Ariz.; Big Hatchet Peak, Camel Mountain, Dog Mountains, Hachita, Mount Riley, Noria, Victorio, and Walnut Wells, N. Mex.; Agua Fria, Bone Spring, Buck Hill, Bullis Gap, Dove Mountain, Dryden Crossing, Hood Spring, Indian Wells, Jordan Gap, Nine Point Mesa, Reagan Canyon, Santiago Peak, and Tascotal Mesa, Tex.

Progress in the drafting of additional sheets was made as follows: Oatman special, Ariz., 9 per cent; Animas Peak, N. Mex., 10 per cent; Antelope Wells, N. Mex., 85 per cent; Canutillo, N. Mex., 90 per cent; Cienega Springs, N. Mex., 95 per cent; Playas, N. Mex., 45 per cent; Pratt, N. Mex., 20 per cent; Maravillas Canyon, Tex., 70 per cent.

Primary-level circuits were adjusted for the following quadrangles: Anapra No. 2, Animas Peak, Antelope Wells, Big Hatchet Peak, Columbus, Hermanas, and Mount Riley No. 1, N. Mex.; Agua Fria, Bullis Gap, Dove Mountain, Dryden Crossing, Indian Wells, and Santiago Mountain, Tex.

Preliminary geographic positions were computed for the following quadrangles: Animas Peak, Antelope Wells, Big Hatchet Peak, Camel Mountain, Canutillo, Cienega Springs, Columbus, Dog Mountains, Hachita, Hermanas, Mount Riley, Noria, Playas, Pratt, Victorio, and Walnut Wells, N. Mex.; Agua Fria, Bone Spring, Dove Mountain, Bullis Gap, Hood Spring, Indian Wells, Buck Hill, Jordan Gap, Santiago Peak, Dryden Crossing, Sanderson, Longfellow, and Marathon, Tex.

WESTERN DEPARTMENT.

FIELD WORK.

Summary.—During the year topographic mapping was carried on in California, Oregon, and Washington. The work included the completion of 18 quadrangles, in addition to which 13 were partly surveyed. The total new area mapped was 3,677 square miles, for publication on the scale of 1:62,500. In addition the revision of parts of two quadrangles in California, covering 114 square miles, was completed. In connection with this work 915 miles of primary levels were run and 171 permanent bench marks were established, and 922 miles of primary traverse were run, and 128 permanent marks set.

Primary triangulation was carried on by two parties in Oregon and Washington, 33 stations being occupied, all of which were marked. This work made control available in 46 quadrangles.

Topographic surveys in western department from July 1, 1917, to June 30, 1918.

State.	Contour interval.	For publication on scale of 1:62,500 (new).	Primary levels.		Primary traverse.		Triangulation stations.	
			Distance run.	Bench marks.	Distance run.	Permanent marks.	Occupied.	Marked.
	Feet.	*Sq. miles.*	*Miles.*		*Miles.*			
California	25, 50	2,890	337	48	....	....	....	....
Oregon	25, 50	58	261	54	534	60	2	4
Washington	25, 50	729	317	69	388	68	31	29
	....	3,677	915	171	922	128	33	33

California.—For the continuation of cooperative topographic surveys in California the Department of Engineering allotted $14,000 and the United States Geological Survey an equal amount, the amount necessary to complete the surveys being paid from Federal funds. The survey of the Adelaida, San Miguel, Bradley, Paso Robles, San Simeon, Gorda, King City, Junipero Serra, Metz, Bryson, Gilroy Hot Springs, Crevison Peak, Jamesburg, Lucia, San Benito, Gonzales, and Bonanza quadrangles, in San Luis Obispo, Monterey, Santa Clara, Stanislaus, Merced, and San Benito counties, was completed, and that of the Hollister, Crows Landing, Pozo, and Mount Boardman quadrangles, in San Benito, Santa Clara, Monterey, Stanislaus, Merced, and San Luis Obispo counties, was begun by J. P. Harrison, C. A. Ecklund, E. P. Davis, G. M. Cunningham, L. H. Connely, R. T. Evans, C. W. Rowell, Emerson Dolliver, S. G. Lunde, C. P. McKinley, E. N. Murphy, T. S. Marlor, J. L. Lewis, E. H. Wilcox, C. D. Curry, R. A. Furrow, C. W. H. Nessler, T. P. Pendleton, R. M. Wilson, C. A. Stonesifer, K. W. Trimble, W. B. Upton, jr., N. E. Ballmer, N. A. Huth, W. G. Carson, E. G. Hamilton, William Stranahan, R. A. Hamilton, and F. C. Witt, the total area mapped being 2,890 square miles, for publication on the scale of 1:62,500, with contour intervals of 25 and 50 feet. In connection with the Lucia, Gorda, and Junipero Serra quadrangles, part of the work previously done was revised to bring the entire maps up to date. The area covered by this revision was 114 square miles. Of the Gorda, Junipero Serra, Bryson, Jamesburg, and Lucia quadrangles 364 square miles lies in the Monterey National Forest, and of the San Benito quadrangle 15 square miles lies in the Pinnacles National Forest, making a total area in the national forests of 379 square miles. For the control of these areas L. F. Biggs, N. E. Ballmer, and R. C. Seitz ran 337 miles of primary levels and established 48 permanent bench marks. The War Department did not cooperate in the mapping of the following quadrangles San Miguel, Bradley, Pozo, Paso Robles, Adelaida, Crevison Peak, Gilroy Hot Springs, Hollister, Jamesburg, Point Sur, Lucia, Crows Landing, and Mount Boardman.

Oregon.—The survey of the northeast quarter of the Glenada quadrangle, the southeast quarter of the Heceta quadrangle, and the Cottage Grove quadrangle, in Lane County, Oreg., was begun by R. M. Wilson, E. G. Hamilton, N. A. Huth, and C. A. Ecklund, the area mapped being 58 square miles, for publication on the scale of 1:62,500, with a contour interval of 25 feet. For the control of these areas and of the Disston, Alsea, Coos Bay, Drain, Wendling, Scottsburg, and Cape Foul Weather quadrangles, L. F. Biggs ran 261 miles of primary levels and established 54 permanent bench marks, and J. C. Fales, F. J. McMaugh and G. T. Hawkins ran 534 miles of primary traverse and set 60 permanent marks. Triangulation was carried on by G. T. Hawkins, 2 stations being occupied and 4 permanently marked. This work made control available in 21 quadrangles.

Washington.—For the continuation of cooperative topographic surveys in Washington the State Board of Geological Survey allotted $10,500 and the United States Geological Survey allotted an equal amount, the amount necessary to complete the surveys being paid from Federal funds. The mapping of the Samish Lake quadrangle, in

Whatcom and Skagit counties, was completed, and that of the Port Angeles (40 square miles of which lies in the Olympic National Forest), Port Crescent, Van Zandt, Wickersham, Pysht Lake, and Crescent Lake quadrangles, in Clallam, Whatcom, and Skagit counties, was begun by S. G. Lunde, W. C. F. Bastian, J. L. Lewis, H. M. Eakin, D. B. Duckering, K. A. Heath, J. A. Campbell, jr., K. D. Campbell, N. E. Ballmer, W. G. Carson, E. T. Walker, R. H. Sargent, R. M. Wilson, C. P. McKinley, K. W. Trimble, T. P. Pendleton, Fred Rider, T. S. Marlor, R. T. Evans, J. P. Harrison, C. D. Curry, and R. A. Furrow, the total area mapped being 729 square miles, for publication on the scale of 1:62,500, with contour intervals of 25 and 50 feet. For the control of these areas L. F. Biggs and R. C. Seitz ran 317 miles of primary levels and established 69 permanent bench marks, and F. J. McMaugh, L. F. Biggs, and C. F. Urquhart ran 388 miles of primary traverse and set 68 permanent marks. Triangulation was carried on by C. F. Urquhart, 31 stations being occupied and 29 permanently marked.

OFFICE WORK.

The drafting of the following topographic maps was completed: Piedras Blancas and San Miguel, Cal.; Port Angeles and Samish Lake, Wash.

Progress in the drafting of additional sheets was made as follows: Bradley, Cal., 85 per cent; Bryson, Cal., 5 per cent; Daulton, Cal.. 10 per cent; Elgin, Cal., 80 per cent; Gorda, Cal., 70 per cent; Jamesburg, Cal., 10 per cent; King City, Cal., 10 per cent; Junipero Serra, Cal., 10 per cent; Las Garzas Creek, Cal., 10 per cent; Metz, Cal., 85 per cent; No. 10, Cal., 80 per cent; San Benito, Cal., 10 per cent; San Luis Creek, Cal., 15 per cent; San Miguel, Cal., 80 per cent; San Simeon, Cal., 30 per cent; Volta, Cal., 80 per cent.

Primary-level circuits were adjusted for the following quadrangles: Adelaida, Bradley, Bryson, Cayucos, Cholame, Paso Robles, Piedras Blancas, San Simeon, and Valleton, Cal.; Alsea No. 3, Black Butte, Cottage Grove, Glenada No. 1, and Yoncalla, Oreg.; Dungeness, Lake Crescent, Port Angeles, Port Crescent, and Pysht, Wash.

Geographic positions were computed for the following quadrangles: Alsea No. 2, Alsea No. 3, Alsea No. 4, Black Butte, Coos Bay, Cottage Grove, Lowell, Glenada No. 1, Glenada No. 4, Heceta No. 1, Heceta No. 4, Mohawk, Mound, Roseburg, Scottsburg No. 2, Scottsburg No. 3, and Yoncalla, Oreg.; Crescent Lake, Dungeness, Pleasant Lake, Port Angeles, Port Crescent, Pysht, Samish Lake, Sumas, Van Zandt, and Wickersham, Wash.

WATER-RESOURCES BRANCH.

ORGANIZATION.

The work of the water-resources branch is conducted under the supervision of N. C. Grover, chief hydraulic engineer, and is organized in six divisions:

Division of surface waters, John C. Hoyt, hydraulic engineer, in charge.
Division of ground waters, O. E. Meinzer, geologist, in charge.
Division of quality of waters, Alfred A. Chambers, assistant chemist, in charge.
Division of power resources, W. B. Heroy, geologist, in charge.
Division of water utilization, N. C. Grover, in charge.
Division of enlarged and stock-raising homesteads, N. C. Grover, in charge.

PERSONNEL.

During the year the technical force of the branch has been reduced 46, of whom 24 entered the military service and 22 resigned or were transferred, and has been increased 134 by new appointments. At the end of the year the force consisted of 1 chief hydraulic engineer, 15 hydraulic engineers, 7 engineers, 22 assistant engineers, 20 junior engineers, 2 geologists, 3 associate geologists, 2 assistant geologists, 1 assistant chemist, 2 junior chemists, 7 classifiers, 1 land classifier, 13 assistant classifiers, and 65 junior classifiers—a total of 161. Of this number 1 hydraulic engineer is on furlough, and 1 hydraulic engineer, 1 assistant engineer, 1 engineer, and 1 junior engineer are employed occasionally.

The members of the water-resources branch named below entered the military service. The status given is that of June 30, 1918.

Kirk Bryan, 104th Engineers, 29th Division, France.

John W. Campbell, second lieutenant, Company A, 69th Engineers, Fort Myer, Va.

Harold C. Cloudman, captain; honorably discharged April 16, 1918.

George S. Cowdrey, jr., private.

Aldace H. Davison, first lieutenant, 303d Engineers, Camp Dix, N. J.

Henry J. Dean, first lieutenant, First Provincial Battalion, E. M. P., Fort Benjamin Harrison, Ind.

William E. Dickinson, second lieutenant; honorably discharged April 8, 1918.

Donald A. Dudley, corporal, Company D, 314th Engineers, France.

Joe B. Entringer, sergeant major; candidate for commission, First Unit, 2d Company, Fourth Officers' Training School, Camp Grant, Ill.

Edgar O. Francisco, first lieutenant, Company B, 602d Engineers, Camp Devens, Mass.

Eugene L. Grant, private.

Homer E. Grosbach, private, Ground School, Princeton University, N. J.

Warren E. Hall, captain, Company D, 506th Engineers, France.

Oliver W. Hartwell, first lieutenant; honorably discharged October 20, 1917.

Bernard A. Howell, second lieutenant, France.

Clarence C. Jacob, captain; honorably discharged August 15, 1917.

Reid Jerman, private.

Joseph Krauskopf, private, Company K, Sixteenth Infantry, Camp Kearney, Cal.

George K. Larrison, captain, Company I, Engineer Officers' Training Camp, Camp Lee, Va.

Otto Lauterhahn, private, G. R. S., Unit B, Quartermasters Corps, France.

George J. Lyon, captain, Interior Storage Depot, Quartermasters Corps, Schenectady, N. Y.

Lester R. McNeely, private, Base Hospital No. 35, Camp Kearney, Cal.

Paul G. Mayer, private, headquarters company, Twelfth Infantry, Camp Fremont, Cal.

Arthur H. Montford, private.

Malcolm G. Murray, private.

J. Wendell Moulton, private; honorably discharged October 12, 1917.

John R. Neale, private.

Charles H. Pierce, first lieutenant; honorably discharged April 12, 1918.

James P. Reddick, United States Navy, San Diego, Cal.

John J. Sanford, second lieutenant; honorably discharged August 7, 1917.

George H. Smalley, United States Naval Training Station, Seattle, Wash.

James E. Stewart, in training for commission; honorably discharged November 20, 1917.

Harry Thompson, captain; honorably discharged February 17, 1918.

Eugene L. Williams, second lieutenant, Engineer Officers' Reserve Corps, France.

Leon Willie, private, Camp Lewis, Wash.

Of the above, Capts. George K. Larrison and Clarence C. Jacob, First Lieuts. Henry J. Dean, Aldace H. Davison, Oliver W. Hartwell, and Charles H. Pierce, and Second Lieut. William E. Dickinson were reported in the preceding year.

The contribution of this branch to war service is shown in Plate IV.

In the clerical force there were 17 separations (2 for military service) and 26 accessions, and at the end of the year the force numbered 37.

ALLOTMENTS.

The appropriation for gaging streams was $175,000, of which $25,000 might be used for drilling exploratory wells in arid regions, an increase of $25,000 over the preceding year. The cooperative funds made available by State allotments have been increased in some States and decreased in others, and these changes made necessary corresponding adjustments of the work.

An appropriation of $150,000 for examination of lands under the stock-raising homestead law enacted December 29, 1916, was included in the sundry civil act approved June 12, 1917, to be immediately available. The urgent deficiency act, approved March 28, 1918, carried an additional appropriation of $200,000 for this investigation.

An appropriation of $10,000 for discovering, improving, and marking water holes in the arid West was authorized by act approved June 12, 1917.

U. S. GEOLOGICAL SURVEY

SPECIAL WAR WORK ON—

POWER SURVEY.

Hydroelectr

Steam electr

Interconnection of power systen

GENERAL WATER-SUPPLY REPORTS.

Ground-water supplie

Surface-water supplie

Quality of wat

Water storaj

SPECIAL EXAMINATIONS.

Camp water supplie

Other military water supplie

Industrial water supplie

Pow

Sanitation and quality of wat

Drainage of camp

Floods at camp sit

POWER AND WATER SYSTEMS.

Capitalizatic

Priority orde

DESERT SPRINGS.

Camp supplie

CONFIDENTIAL MILITARY DA

FOREIGN POWER RESOURCI

DIRECT MILITARY SERVICE.

Office

Me

CONTRIBUTIONS TO WA

The appropriations were allotted as follows:

For gaging streams:			
General administration:			
Direct	$10,487.50		
Denver distribution office	2,200.00		
		$12,687.50	
Editorial		1,800.00	
Branch administration		6,230.00	
Computations		16,500.00	
Reviewing manuscript		3,000.00	
Inspection		2,000.00	
			$42,217.50
Surface water:			
New England:			
Maine and Connecticut	$1,350.00		
New Hampshire	1,000.00		
Vermont	900.00		
Massachusetts	2,250.00		
		5,500.00	
New York		3,500.00	
Middle Atlantic States		600.00	
South Atlantic States		4,500.00	
Ohio River valley		8,000.00	
Upper Mississippi River:			
Illinois	$1,000.00		
Iowa	500.00		
Minnesota	2,000.00		
Wisconsin	2,500.00		
		6,000.00	
Kansas		2,500.00	
Colorado, Wyoming, and New Mexico		7,500.00	
Montana and North Dakota		4,300.00	
Great Basin:			
Utah	$4,000.00		
Nevada	2,500.00		
		6,500.00	
Idaho and Yellowstone National Park		2,800.00	
Oregon		4,000.00	
Washington		4,000.00	
California		4,000.00	
Arizona		3,500.00	
Texas		4,000.00	
Hawaii		4,500.00	
			75,700.00
Ground water			22,450.00
Well drilling, field			21,200.00
Classification of lands:			
Land-classification board		7,000.00	
Utilization, general		5,500.00	
			12,500.00
Contingent			932.50
			175,000.00

For enlarged and stock-raising homesteads:	
Field work	$275,600.00
Land-classification board	50,000.00
General administration	18,000.00
Branch administration	6,400.00
	350,000.00

Of the total appropriations, 86 per cent was allotted for work in public-land States.

COOPERATION.

States.—Cooperative funds were allotted by several States as follows:

Alabama		$170.00
Arizona		2,980.00
California:		
State engineer	$9,070.00	
State Water Commission	7,095.00	
City of San Francisco	2,455.00	
		18,620.00
Colorado		600.00
Hawaii		19,060.00
Illinois		2,675.00
Iowa:		
State Geological Survey	$500.00	
State Highway Commission	315.00	
		815.00
Kansas		2,815.00
Kentucky		250.00
Maine		3,670.00
Massachusetts		2,025.00
Montana		1,720.00
Nevada		2,765.00
New Hampshire		1,060.00
New York:		
State engineer	$2,170.00	
Conservation Commission	8,860.00	
		11,030.00
North Dakota		385.00
Oregon		6,935.00
Texas		10,965.00
Utah		8,045.00
Vermont		1,065.00
Washington		6,865.00
Wisconsin		5,055.00
Wyoming		4,450.00

The work done under cooperative agreement with the States has been restricted to studies of stream flow, except in California, Montana, and Hawaii.

In California the State cooperated in all the ground-water work. (See pp. 121–122.)

In Hawaii measurements of streams were supplemented by measurements of precipitation and studies of the loss of water in irrigation canals.

The investigation of ground waters in Montana, begun in 1916 in cooperation with the State engineer, was continued. The chemical analyses of the waters are made at the laboratory of the State Board of Health in the Montana State College.

War Department.—Many reports, based on special field investigations and office studies, were prepared and submitted to the departments and bureaus engaged in the conduct of the war.

Stream measurements made in connection with studies of flood control and navigation in the Ohio River basin have been continued in cooperation with the Corps of Engineers, United States Army.

Reclamation Service.—The measurement of streams that are to furnish water to reclamation projects under construction has been continued in cooperation with the United States Reclamation Service. The field work is done by Survey engineers who are employed in the locality, and the actual cost is repaid by the Reclamation Service through transfer of funds.

The Survey also continued to assist the Reclamation Service in an investigation undertaken to obtain a basis for the equitable distribution of the waters of Milk and St. Mary rivers—a work carried on under cooperative agreement with the Canadian Department of the Interior.

Office of Indian Affairs.—In accordance with authorizations by the Office of Indian Affairs, stream gaging was continued on the following Indian reservations: Menominee, La Pointe, Standing Rock, Rosebud, Pine Ridge, Crow, Yakima, Quinault, Colville, Warm Springs, Klamath, Fort Hall, Willow and Sand creeks, Gila River, Duck Valley, Uinta, and Overland Creek.

National Park Service.—Streams in the Yosemite, Glacier, and Yellowstone national parks were measured during the year at stations maintained in cooperation with the National Park Service.

Forest Service.—A study of stream flow in the Angeles National Forest, in southern California, in cooperation with the Forest Service, was continued.

City of San Francisco.—In connection with the proposed storage of the water of Tuolumne River in Hetch Hetchy Valley as a water supply for the city of San Francisco, measurement of that stream was continued in cooperation with the city government.

PUBLICATIONS.

The publications of the year prepared by the water-resources branch comprise 17 reports and 2 separate chapters. Titles and brief summaries of these publications are given on pages 27–30. At the end of the year 15 reports and 3 separate chapters were in press and 8 manuscripts were awaiting editorial examination.

GENERAL SUMMARY.

In the investigation of surface waters the water-resources branch has maintained gaging stations for measuring discharge of streams in 40 States and in Hawaii and Alaska. This year, as last, the relatively large amount of work in progress has been made possible only because of extensive cooperation with States and other Federal organizations. Twenty-three cooperating States (including Hawaii) have contributed about $114,000 for work in these States, and the Indian Office, Engineer Corps, Reclamation Service, and Forest Service have also cooperated largely in the study of flow of particular streams. The cooperating States include, besides many of the Northern and Eastern States, all the States in the Great Basin and on the Pacific slope and nearly all those in the Rocky Mountain and western Gulf groups, where water is necessary for irrigating agricultural lands.

Ground-water investigations have been made in 20 States, in the District of Columbia, and in Alaska.

Many investigations of the present and probable future use of both surface and ground waters have been made in connection with the classification of the public lands, with special reference to their use for power, under permit, or for agriculture, under the enlarged-homestead, desert-land, or Carey acts. The results of such investigations are generally incorporated in unpublished special reports to the Commissioner of the General Land Office and to the Secretary of the Interior.

DIVISION OF SURFACE WATERS.

ORGANIZATION.

The work of the division of surface waters consists primarily of the measurement of the flow of rivers, but it includes also special investigations of conditions affecting stream flow and the utilization of the streams.

In carrying on the work the United States is divided into 17 districts, including Hawaii. The location of the districts and district offices and the names of the engineers in charge are given in the following list:

New England: C. H. Pierce, Customhouse, Boston, Mass.
New York: C. C. Covert, Federal Building, Albany, N. Y.
Middle Atlantic: G. C. Stevens, Washington, D. C.
South Atlantic and Eastern Gulf: W. E. Hall, Federal Building, Atlanta, Ga.
Ohio River: A. H. Horton, Washington, D. C.
Upper Mississippi River: W. G. Hoyt, Capitol Building, Madison, Wis.; suboffice Federal Building, Chicago, Ill.
Kansas: R. C. Rice, Federal Building, Topeka, Kans.
Upper Missouri: W. A. Lamb, Montana National Bank Building, Helena, Mont.
Rocky Mountain: Robert Follansbee, New Post Office Building, Denver, Colo.
Great Basin: C. C. Jacob, Federal Building, Salt Lake City, Utah.

Idaho: G. C. Baldwin, Idaho Building, Boise, Idaho.
Washington: G. L. Parker, Federal Building, Tacoma, Wash.
Oregon: F. F. Henshaw, Couch Building, Portland, Oreg.
California: H. D. McGlashan, Customhouse, San Francisco, Cal.; suboffice, Federal Building, Los Angeles, Cal.
Arizona: C. E. Ellsworth, Fleming Building, Phoenix, Ariz.
Texas: G. A. Gray, Old Post Office Building, Austin, Tex.
Hawaii: G. K. Larrison, Capitol Building, Honolulu, Hawaii.

CHARACTER AND METHODS OF WORK.

Field investigations necessary to the work are made from the district offices, where the results are sufficiently analyzed to insure accuracy and completeness. At selected places, known as gaging stations, the volume of water carried by the streams is measured and records of stage and other data are collected from which the daily flow of the streams is computed. Data collected from the district offices are transmitted to Washington, where they are reviewed in the computing section and prepared for publication. By this review the records obtained in different parts of the country are brought to a uniform standard, and standardization is further effected through annual conference of the engineers.

At the end of the year 1,182 gaging stations were being maintained, including 73 in Hawaii; 268 stations were discontinued and 272 new stations established during the year. Records for about 200 additional stations were received, ready for publication, from other Government bureaus and private persons, and a number of Government and State organizations and individuals also cooperated in the maintenance of many of the regular gaging stations.

Gaging stations and cooperating parties for the year ending June 30, 1918.

State.	Geological Survey alone.	Reclamation Service.	Forest Service.	Indian Office.	Army Engineers.	Weather Bureau.	Other Federal bureaus.	State cooperation.	Municipal cooperation.	Private persons.	Counted more than once.	Maintained at end of year.	Established during year.	Discontinued during year.	Regular gagings during year.	Miscellaneous gagings during year.
Alabama	....	....	....	....	1	....	....	3	....	1	....	5	1	1	24	5
Arizona	....	1	....	6	2	....	....	18	....	1	4	24	3	3	237	76
California	....	....	26	2	....	2	5	162	26	37	98	162	23	12	907	210
Colorado	8	2	17	....	....	1	....	17	2	5	4	48	7	6	196	3
Connecticut	....	....	....	....	....	....	....	....	....	1	....	1	....	....	4	....
Georgia	1	....	....	....	....	4	....	....	....	15	1	19	1	4	45	5
Idaho	....	40	1	14	....	1	....	....	1	6	1	62	50	34	330	56
Illinois	....	....	....	....	1	1	....	25	1	1	3	26	....	....	100	2
Indiana	....	....	....	....	....	....	....	....	....	1	....	1	....	....	....	....
Iowa	....	....	....	....	....	3	....	21	....	....	3	21	7	....	46	8
Kansas	....	....	....	....	....	....	....	8	....	....	....	8	5	....	40	....
Kentucky	....	....	....	....	....	....	....	5	....	....	....	5	....	....	16	4
Maine	....	....	....	....	....	....	....	16	....	2	2	16	....	....	69	....
Maryland	3	....	....	....	....	....	....	....	....	....	....	3	....	....	8	....
Massachusetts	....	....	....	....	....	....	....	15	....	1	1	15	....	2	95	....
Michigan	....	....	....	....	....	....	....	....	1	1	....	2	....	....	....	....
Minnesota	2	....	....	....	3	2	....	1	....	....	....	8	1	22	29	....
Montana	10	51	16	7	....	....	....	20	....	1	....	106	18	1	393	31
Nevada	....	2	....	3	....	1	....	32	....	9	15	32	3	5	135	7
New Hampshire	....	....	....	....	....	....	....	3	....	7	....	10	4	....	72	9
New Jersey	1	....	....	....	....	....	....	....	....	....	....	1	....	....	1	....
New Mexico	....	....	....	....	....	....	....	....	....	....	....	....	....	4	3	....
New York	....	....	....	....	1	4	....	45	1	7	13	45	3	6	367	5
North Carolina	....	....	....	....	....	1	....	....	....	4	....	5	1	1	6	2
North Dakota	....	....	....	1	....	....	....	5	....	....	....	6	....	....	32	4
Ohio	1	....	....	....	2	....	....	....	....	....	....	3	....	....	,5	2
Oklahoma	....	4	....	....	....	....	....	....	....	....	....	4	....	....	4	....
Oregon	....	4	1	12	....	2	....	11	13	44	1	86	15	35	388	83
Rhode Island	....	....	....	....	....	....	....	....	....	....	....	....	....	1	....	....
South Carolina	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	....
South Dakota	....	....	....	4	....	....	....	1	....	....	....	5	....	....	35	....
Tennessee	....	....	....	....	....	2	....	....	....	6	....	8	....	....	24	4
Texas	....	1	....	....	....	3	....	42	5	5	14	42	4	1	427	175
Utah	....	....	....	6	....	....	....	113	....	79	85	113	10	15	970	66
Vermont	....	....	....	....	....	....	....	9	....	4	4	9	....	....	62	....
Virginia	2	....	....	....	....	1	....	....	....	2	....	5	....	....	7	1
Washington	2	1	7	11	....	....	1	4	5	31	1	61	11	14	526	13
West Virginia	7	....	....	....	6	1	....	....	....	1	....	15	....	2	43	5
Wisconsin	....	....	....	2	2	....	....	45	....	12	16	45	3	3	178	6
Wyoming	....	37	5	....	....	1	3	43	....	6	12	83	82	57	486	16
Hawaii	....	....	....	....	....	....	....	73	2	26	28	73	20	30	427	86
	37	143	73	68	18	30	9	737	57	316	306	1,182	272	268	6,937	986

PUBLICATIONS.

For convenience and uniformity in publication the United States has been divided into 12 primary drainage basins, and the results of stream measurements are published annually in a series of progress reports that correspond to these 12 divisions. Prior to 1914 the records for each division were contained in a single water-supply paper; since 1914 the records for the twelfth division have been published as three papers. In addition to the progress reports, special reports on various hydraulic subjects have been completed for publication during the year.

The following table shows the division into drainage areas and gives the numbers of water-supply papers containing results of stream measurements for 1899 to 1918:

Numbers of water-supply papers containing results of stream measurements, 1899–1918.

Year.	I North Atlantic slope (St. John River to York River).	II South Atlantic and eastern Gulf (James to the Mississippi).	III Ohio River.	IV St. Lawrence River and Great Lakes.	V Hudson Bay and upper Mississippi River.	VI Missouri River.	VII Lower Mississippi River.	VIII Western Gulf of Mexico.	IX Colorado River.	X Great Basin.	XI Pacific slope in California.	XII North Pacific slope basins. Pacific slope in Washington and upper Columbia River.	 Snake River basin.	 Lower Columbia River and Pacific slope in Oregon.
1899 [a]	35	[b] 35, 36	36	36	36	[c] 36, 37	37	37	[d] 37, 38	38, [e] 39	38, [f] 39	38	38	38
1900 [g]	47, [h] 48	48	48, [i] 49	49	49	49, [j] 50	50	50	50	51	51	51	51	51
1901	65, 75	65, 75	65, 75	65, 75	[k] 65, 66, 75	66, 75	[k] 65, 66, 75	66, 75	66, 75	66, 75	66, 75	66, 75	66, 75	66, 75
1902	82	[b] 82, 83	83	[l] 82, 83	[k] 83, 85	84	[k] 83, 84	84	85	85	85	85	85	85
1903	97	[b] 97, 98	98	97	[k] 98, 99, [m] 100	99	[k] 98, 99	99	100	100	100	100	100	100
1904	[n] 124, [o] 125, [p] 126	[p] 126, 127	128	129	[k] 128, 130	130, [q] 131	[k] 128, 131	132	133	133, [r] 134	134	135	135	135
1905	[n] 165, [o] 166, [p] 167	[p] 167, 168	169	170	171	172	[k] 179, 173	174	175, [s] 177	176, [r] 177	177	178	178	[t] 177, 18
1906	[n] 201, [o] 202, [p] 203	[p] 203, 204	205	206	207	208	[k] 205, 209	210	211	212, [r] 213	213	214	214	214
1907–8	241	242	243	244	245	246	247	248	249	250, [r] 251	251	252	252	252
1909	261	262	263	264	265	266	267	268	269	270, [r] 271	271	272	272	272
1910	281	282	283	284	285	286	287	288	289	290	291	292	292	292
1911	301	302	303	304	305	306	307	308	309	310	311	312	312	312
1912	321	322	323	324	325	326	327	328	329	330	331	332–A	332–B	332–C
1913	351	352	353	354	355	356	357	358	359	360	361	362–A	362–B	362–C
1914	381	382	383	384	385	386	387	388	389	390	391	392	393	394
1915	401	402	403	404	405	406	407	408	409	410	411	412	413	414
1916	431	432	433	434	435	436	437	438	439	440	441	442	443	444
1917	451	452	453	454	455	456	457	458	459	460	461	462	463	464
1918	471	472	473	474	475	476	477	478	479	480	481	482	483	484

Rating tables and index to Water-Supply Papers 35–39 contained in Water-Supply Paper 39. Tables of monthly discharge for 1899 in Twenty-first Annual Report, Part IV.

[b] James River only.

[c] Gallatin River.

[d] Green and Gunnison rivers and Grand River above junction with Gunnison.

[e] Mohave River only.

[f] Kings and Kern rivers and south Pacific slope basins.

[g] Rating tables and index to Water-Supply Papers 47–52 and data on precipitation, wells, and irrigation in California and Utah contained in Water-Supply Paper 52. Tables of monthly discharge for 1900 in Twenty-second Annual Report, Part IV.

[h] Wissahickon and Schuylkill rivers to James River.

[i] Scioto River.

[j] Loup and Platte rivers near Columbus, Nebr., and all tributaries below junction with Platte.

[k] Tributaries of Mississippi from east.

[l] Lake Ontario and tributaries to St. Lawrence River proper.

[m] Hudson Bay only.

[n] New England rivers only.

[o] Hudson River to Delaware River, inclusive.

[p] Susquehanna River to Yadkin River, inclusive.

[q] Platte and Kansas rivers.

[r] Great Basin in California except Truckee and Carson river basins.

[s] Below junction with Gila.

[t] Rogue, Umpqua, and Siletz rivers only.

DIVISION OF GROUND WATERS.

SCOPE OF WORK.

The work done by the division of ground waters in the fiscal year 1917–18 included (1) examinations and reports for the War and Navy departments on ground-water supplies for military establishments, (2) the survey of desert watering places and the erection of signs directing travelers to such watering places, and (3) exploratory drilling in the arid regions to discover water supplies for irrigation.

Shortly before the United States entered the war a comprehensive digest of information relating to water supplies available for use at military camps had been submitted to the War Department. As soon as the country entered the war a large number of problems arose in regard to water supplies for the numerous military and naval establishments that were created in different parts of the country. The War and Navy departments called on the Geological Survey for assistance in solving these problems, and work on military water supplies was given precedence over all other work in the division. Up to the end of the fiscal year information and advice were given to the War and Navy departments by this division and by the section of Coastal Plain investigations, with which there was close cooperation, in regard to ground-water supplies at about 50 localities.

The survey and marking of desert watering places was authorized by an act of Congress (S. 1351), approved August 21, 1916, which provided an appropriation of $10,000 and read as follows:

> *Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled,* That the Secretary of the Interior be and he is hereby authorized and empowered, in his discretion, in so far as the authorization made herein will permit, to discover, develop, protect, and render more accessible for the benefit of the general public springs, streams, and water holes on arid public lands of the United States; and in connection therewith to erect and maintain suitable and durable monuments and signboards at proper places and intervals along and near the accustomed lines of travel and over the general area of said desert lands, containing information and directions as to the location and nature of said springs, streams, and water holes, to the end that the same may be more readily traced and found by persons in search or need thereof; also to provide convenient and ready means, apparatus, and appliances by which water may be brought to the earth's surface at said water holes for the use of such persons; also to prepare and distribute suitable maps, reports, and general information relating to said springs, streams, and water holes and their specific location with reference to lines of travel.

A reconnaissance of conditions affecting ground water in the desert regions was carried on in connection with the survey of watering places, and a considerable part of the regular allotment for ground-water investigations was therefore used in this project in addition to the sum specifically appropriated for the survey of watering places.

The region surveyed occupies about 60,000 square miles in southern California and southwestern Arizona. In California it includes the southern part of Death Valley and the region between this valley and the Mexican border; in Arizona it includes the region west of Tucson and Phoenix and south of Wickenburg and Parker. This region was selected because it is the driest, hottest, and least explored part of the desert region, and also because of the strategic importance of obtaining information on the water supplies along the 350 miles of national frontier that it includes. The field work was done by four parties, each of which consisted of one geologist and one nontechnical assistant outfitted with an automobile and light camping equipment. The mapping was done with planetable on a scale of 1:125,000. Practically all watering places in the region were examined, about 160 samples of water were collected and shipped to the water-resources laboratory at Washington, D. C., for analysis, and a general exploration was made of the geography, geology, and ground-water conditions of the region. The maps made and the data obtained were made available to the Army engineers for incorporation in the progressive military map of the United States now in preparation. Guides with maps are being prepared for publication.

Signs directing travelers to water were erected at 167 localities in California and 138 in Arizona. The signposts are galvanized iron, 1.9 inches in outside diameter, and 12 feet long. Each post is anchored in the ground with two redwood blocks. The signs are 18-gage steel, galvanized, are white, with dark-blue letters, and are substantially bolted to the posts. They are of two sizes, 18 by 20 inches and 9 by 20 inches. Most of the larger signs, of which 470 were erected, give the names, distances, and directions to four watering places; most of the smaller signs, 165 of which were erected, give the names, distances, and directions to two watering places. The work done in this fiscal year is a part of a comprehensive plan for mapping and marking the watering places in the entire arid region lying east of the Sierra Nevada and Cascade Mountains and west of a line running approximately from eastern Oregon through Salt Lake City and Santa Fe to the mouth of Pecos River.

The exploratory drilling was undertaken as a result of an authorization by Congress for expending from the regular appropriation an amount not to exceed $25,000 for exploratory drilling in the arid regions to discover water for irrigation. The work was done in Steptoe Valley, a desert valley near Ely, Nev., where the geologic conditions indicated the existence of ground water in sufficient quantity for practical irrigation. The results obtained were favorable. Three wells were drilled, two of which obtained large supplies within 100 feet of the surface. The other well was carried to a depth of 914 feet and demonstrated the absence of deep water-bearing beds of sufficient yield to be practicable for irrigation. A careful survey was made of the entire region, and a report is to be published that will give detailed information on the results obtained, outline the area in which ground-water conditions are favorable, and set forth the economic difficulties that may be expected in utilizing the ground water for irrigation. The abnormal conditions created by the war made it very difficult to obtain adequate equipment and competent drillers and added largely to the expense of the work. A fuller statement on these aspects of the work will be made in the forthcoming report.

A bibliography of the publications of the United States Geological Survey relating to ground water, with brief abstracts, detailed index, and map, was prepared by O. E. Meinzer and was submitted for publication as Water-Supply Paper 427.

An outline and glossary of terms relating to ground water was prepared by Mr. Meinzer and was submitted to numerous authorities for criticism. When all the terms and definitions which it contains have been carefully considered, this outline and glossary is to be published as a water-supply paper.

A paper on the classification of springs, by Kirk Bryan, was completed by the author and submitted for publication as Water-Supply Paper 450-A.

A. J. Ellis was placed in charge of statistics on production of mineral waters for the division of mineral resources. He prepared the chapter on the production of mineral waters for the annual volume Mineral Resources of the United States for 1917.

Cooperation with the committee on physiography was continued. Mr. Meinzer continued to serve on that committee, and Mr. Ellis undertook the preparation of texts describing the geography of the La Jolla quadrangle, Cal., which includes Camp Kearney, and of the San Diego quadrangle, Cal., which includes the Point Loma military reservation and Rockwell field.

As in previous years, the investigations of ground water on the Atlantic and Gulf Coastal Plain were conducted in cooperation with the section of Coastal Plain investigations, the work being under the direct supervision of T. W. Vaughan, geologist in charge of that section.

The Ground Water Club, a semiofficial organization for professional study, held a number of meetings, most of which were devoted to discussions of the terms defined in Mr. Meinzer's glossary.

Nearly 40 investigations of ground water were in progress in the course of the year, covering areas in Alaska, Arizona, California, Connecticut, Iowa, Maryland, Mississippi, Montana, Nebraska, Nevada, New Mexico, Oklahoma, South Carolina, South Dakota, Texas, Utah, Virginia, Washington, and Wyoming. The progress of most of these investigations was notably delayed by the conditions produced by the war.

WORK BY STATES.

Alaska.—The report on the mineral springs of Alaska, by G. A. Waring, with a chapter on the quality of the water by R. B. Dole and A. A. Chambers, was published as Water-Supply Paper 418. This report was prepared in cooperation with the division of Alaskan mineral resources.

Arizona.—Half of the work on desert watering places was done in Arizona. The region south of Gila River and extending from Tucson and Nogales to Yuma was covered by Kirk Bryan; the Gila Valley and the region extending north from this valley to Wickenburg and Parker was covered by C. P. Ross. Signs directing travelers to water were erected at 138 localities. By the end of the fiscal year the field work was finished and the guide and maps for the region covered by Mr. Ross was nearly finished. The office work on the region covered by Mr. Bryan was delayed by his entrance into military service soon after the completion of his field work.

A brief report on the geology and water resources of the San Carlos Indian Reservation, written in a previous year by A. T. Schwennesen, was prepared for publication as a part of the "Contributions to hydrology."

California.—Half of the work on desert watering places was done in California. The desert area in San Bernardino County was covered by D. G. Thompson, and that in Imperial County and parts of Riverside and San Diego counties by J. S. Brown. Signs directing travelers to water were erected at 167 localities, for 26 of which the posts were furnished by San Bernardino County. By the end of the fiscal year all the field work was completed and the guides and maps which are to be published were about one-half prepared.

The report on ground water in San Jacinto and Temecula basins, by G. A. Waring, is in press as Water-Supply Paper 429.

The manuscript of a report on the geology and ground-water resources of the western part of San Diego County, by A. J. Ellis and C. H. Lee, was completed and is to be published as Water-Supply Paper 446. A manuscript report on the area was furnished to the State engineer, chiefly for use in connection with problems relating to military water supplies.

A brief report on Lanfair Valley, prepared by D. G. Thompson, is to be incorporated with a report on Ivanpah, Mesquite, and Pahrump valleys, by G. A. Waring, to be published as one of the "Contributions to hydrology."

A reconnaissance of the ground-water conditions in Mohave Valley was made in the previous year by G. A. Waring, and additional field work was done in the region this year by D. G. Thompson. A report on the region is to be prepared for publication.

The reports on ground water in Sacramento Valley, by Kirk Bryan, and in Santa Clara Valley, by W. O. Clark, are nearly completed, but little progress was made with either report on account of interference by war work and other urgent work. The field work on Salinas Valley is nearly completed, but the report on that area has not yet been written.

Measurements of depth to the water level in a series of wells in southern California have been made at intervals since 1900, for the purpose of obtaining a long record of the relation between the contributions to the underground reservoirs in the rainy seasons and the withdrawals from them in the dry seasons, when ground water is pumped for irrigation and is withdrawn in large quantities by evaporation and transpiration. These measurements, as in the preceding fiscal year, were made by F. C. Ebert.

All the ground-water work in California is done in financial cooperation with the State Department of Engineering.

Connecticut.—No new field work was done in Connecticut during this fiscal year, but three completed reports and one unfinished report, all based on investigations made in previous years in cooperation with the State Geological and Natural History Survey, H. E. Gregory, State geologist, are awaiting publication. These reports cover the Meriden area, by G. A. Waring; the Southington-Granby area, by H. S. Palmer; the Norwalk and Suffield areas, by H. S. Palmer; and the Pomperaug Valley, by A. J. Ellis. The delay in the publication of these reports is due chiefly to the exigencies of the war.

Delaware.—A chapter on the ground-water resources of Delaware was included in a comprehensive report, entitled "The surface and underground water resources of Maryland, including Delaware and the District of Columbia," by W. B. Clark, E. B. Mathews, and E. W. Berry, and published by the Maryland Geological Survey as Special Publication, Volume X, Part II. Data for this chapter were in large part furnished by the United States Geological Survey.

District of Columbia.—Considerable information on ground water in the District of Columbia is contained in the report of the Maryland Geological Survey referred to in the preceding paragraph. This information was furnished in part by the United States Geological Survey.

Iowa.—A field examination was made of the ground-water conditions in the vicinity of Camp Dodge, near Des Moines, Iowa, by A. J. Ellis, and a manuscript report thereon was submitted to the War Department.

Maryland.—The comprehensive report on the surface and underground water resources of Maryland, mentioned above, was prepared in cooperation between the State and Federal surveys, but the greater part of the work was done by the State.

Mississippi.—The investigation of ground water in Mississippi, which was begun in a previous year, was continued in cooperation with the section of Coastal Plain investigations.

Montana.—The investigation of ground water in Montana, begun in August, 1915, was continued by A. J. Ellis. This investigation is carried on in cooperation with State organizations. The chemical analyses are made at the laboratory of the State Board of Health and the Montana State College, under the supervision of W. M. Cobleigh, director of the laboratory, and records of wells are collected throughout the State by A. W. Mahon, State engineer, in cooperation with W. A. Lamb, district engineer of the United States Geological Survey. In the two preceding years the region south of Yellowstone River was covered by field work, and in the summer of 1917 a ground-water survey was made of Musselshell County. Reports on both regions are in preparation, and the well data for the entire State are being compiled for publication.

Nebraska.—A report on ground water for irrigation in Lodgepole Valley, Wyoming and Nebraska, by O. E. Meinzer, was published as Water-Supply Paper 425-B. This paper includes also a section on the cost of pumping for irrigation in western Nebraska, by H. C. Diesem, of the Office of Public Roads and Rural Engineering, Department of Agriculture.

Nevada.—A reconnaissance of a large part of east-central Nevada was made by O. E. Meinzer and W. O. Clark, and a more detailed ground-water survey of Steptoe Valley was made by Mr. Clark and C. W. Riddell. These investigations were made in connection with the exploratory drilling in Steptoe Valley. The drilling operations were in charge of J. M. Heizer during the first part of the year and of D. H. Walker during the last part.

A report on ground water in Reese River valley and an adjacent part of Humboldt River valley, by G. A. Waring, is in press as Water-Supply Paper 425-D. The area covered in the report by Mr. Waring on Ivanpah, Mesquite, and Pahrump valleys lies in part in Nevada.

New Mexico.—The report on ground water in the Animas, Playas, Hachita, and San Luis basins, in Grant County, N. Mex., by A. T. Schwennesen, with analyses of water and soil by R. F. Hare, is in press as Water-Supply Paper 422. The analyses of water samples and of the water-soluble contents of soil samples from these basins were made through cooperation by the New Mexico Agricultural Experiment Station.

Oklahoma.—A field examination of the ground-water conditions in the vicinity of Fort Sill was made by A. J. Ellis, and a report based on this examination was submitted to the War Department.

South Carolina.—A survey of the ground-water resources of the Coastal Plain province of South Carolina was made in cooperation with the section of Coastal Plain investigations, the work being done by C. W. Cooke, under the direction of T. W. Vaughan. Water samples collected in connection with this investigation were sent to the water-resources laboratory for analysis.

South Dakota.—The report on artesian water in the vicinity of the Black Hills, S. Dak., by N. H. Darton, is in press as Water-Supply Paper 428. This report is a revision of earlier reports on the area by Mr. Darton and includes much new material.

Texas.—The work in Texas was carried on in cooperation with the section of Coastal Plain investigations, and the field of study included the central and western parts of the Coastal Plain province.

Utah.—In the spring of 1918 a reconnaissance of the geology and water resources of a part of southeastern Utah was made by H. E. Gregory, assisted by J. H. Winchell, jr. In the fall of 1917 a brief reconnaissance of western Tooele County was made by O. E. Meinzer and W. O. Clark.

Virginia.—A number of reports that were made to the War Department on ground water in specific localities in Virginia were based in part on special field examinations. In the spring of 1918 detailed field work on ground water was begun in parts of the Coastal Plain province in connection with military mapping by the section of Coastal Plain investigations, under the direction of W. T. Lee.

Washington.—The report on ground water in Quincy Valley, Wash., by A. T. Schwennesen and O. E. Meinzer, is in press as Water-Supply Paper 425-E.

Wyoming.—The report on ground water for irrigation in Lodgepole Valley, Wyoming and Nebraska, by O. E. Meinzer, was published as Water-Supply Paper 425-B.

DIVISION OF QUALITY OF WATER.

Investigations of the quality of water formed part of the work of the ground-water division until January 2, 1918, when the quality of water division was organized. The work of this division consists largely of the analysis of surface and ground waters and the interpretation of such analyses to determine the value of the waters for domestic and industrial uses. Reports have also been made on the quality of the water supplies at camps and cantonments for the War and Navy departments.

Since the new water-resources laboratory was completed, on January 2, 1918, 208 samples of water have been analyzed and classified and calculations and classifications for about 1,500 samples analyzed elsewhere have been made for use in reports on water resources of different parts of the country. Sections on the quality of water have been critically reviewed for 14 reports, and chemical discussions have been written for two reports.

DIVISION OF POWER RESOURCES.

The division of power resources was organized for the purpose of obtaining and compiling information concerning the development of power and its utilization. The immediate occasion for its organization was an agreement with the section of power and light of the Fuel Administration by which the services of the engineers of the water-resources branch were made available for the field study of power problems. W. B. Heroy, who had been in charge of the section of hydrographic classification of the land-classification board, was transferred, on June 1, to the water-resources branch to have immediate charge of the work.

The work of the division is in part statistical and in part engineering. The statistical work consists in obtaining information concerning the installed capacity, fuel requirements, operation, and output of electrical power plants. For the purpose of making a comprehensive power survey of the country a mailing list has been established of all concerns engaged in business as electrical utilities. By the use of this list the fuel requirements of electrical utilities have been ascertained for the statistical department of the Fuel Administration. The existence of surplus power in certain locations has been ascertained, and the information has been placed in the hands of the Bureau of Ordnance and other organizations needing power for the production of war materials. Plans have also been perfected for obtaining, in cooperation with the statistical section of the Fuel Administration, weekly reports on the output of all electrical utilities. The compilation of this information will make possible a weekly review of the power production of the country, segregated between water power and fuel power.

The engineering work of the division has generally been conducted through the engineers in charge of the district offices of the water-resources branch. Several investigations have been made in areas where the production of coal has been retarded by inadequate power supply, and reports have been made suggesting the installation of additional equipment or of emergency interconnections between power stations. Possibilities for the further substitution of water power for fuel have been studied with gratifying results, and fuel economies of importance have been pointed out. The development of new water powers has been encouraged in all proper ways, and the division has assisted in obtaining licenses for the purchase of construction materials and generating equipment.

It is expected that the information obtained covering power development will be summarized in an annual publication, which will be issued as a water-supply paper. The first paper will cover the calendar year 1918.

DIVISION OF WATER UTILIZATION.

The work of the division of water utilization during the fiscal year 1917–18 was to a large extent merged with that of the division of enlarged and stock-raising homesteads by the assignment of E. C. Murphy and E. C. La Rue to investigations conducted by that division. Only occasional investigations pertaining solely to the utilization of water were undertaken.

DIVISION OF ENLARGED AND STOCK-RAISING HOMESTEADS.

The work of organizing field parties for the examination of lands applied for under the enlarged homestead and stock-raising homestead laws was completed as rapidly as possible in the first part of the fiscal year, funds for this work having been made available June 12, 1917. The first parties organized were assigned to work in North Dakota and South Dakota, and shortly thereafter parties were working in Montana, Colorado, Utah, Idaho, Oregon, and Wyoming. As the field season advanced and the weather became unsettled the parties were transferred from the Northern States to New Mexico, Arizona, and southern California, in which field work was carried on throughout the winter. By the middle of October about 100 classifiers of various grades were engaged in active field work, and a force of this size has been maintained with only such modifications as were made necessary by the demands for military service and of good administration. The field force consists of qualified men who make detailed examinations of the lands applied for by the public-land settlers.

Under instructions of the Secretary of the Interior, field examinations are generally confined to lands for which application has actually been made. At the end of the fiscal year field work had been practically completed in New Mexico, Arizona, southern California, southern Utah, eastern Colorado, eastern Wyoming, and North and South Dakota. Field work has also been partly completed in the Boise land district, Idaho; in the Vale, Lakeview, La Grande, Burns, and The Dalles districts, Oreg.; in the Lewistown, Glasgow, Miles City, and Havre districts, Mont.; in the Denver, Montrose, Glenwood Springs, and Durango districts, Colo.; in the Douglas, Evanston, Buffalo, and Lander districts, Wyo.; and field work was nearly completed in the State of Washington. Work in Utah and in northern California is progressing rapidly.

Field examinations of entries under the enlarged-homestead law have been made or were in progress at the end of the fiscal year in South Dakota, Montana, Colorado, New Mexico, southern California, Utah, Oregon, Idaho, and Washington.

LAND-CLASSIFICATION BOARD.

ORGANIZATION AND PERSONNEL.

The land-classification board consists of a division of mineral classification, the work of which pertains to lands valuable for coal, oil, phosphate, and various other minerals, and a division of hydrographic classification, the work of which pertains to irrigation, dry farming, stock raising, and water power. Technical men from other branches of the Survey act in consultation on matters involving important classification. The organization and personnel at the end of the year were as follows:

Chief of branch: W. C. Mendenhall, geologist.

Secretary of the board: Elsie Patterson.

Division of mineral classification: A. R. Schultz, geologist; E. H. Finch and R. W. Howell, associate geologists; H. S. Palmer, assistant geologist.

Division of hydrographic classification: Herman Stabler, hydraulic engineer; R. W. Davenport, J. F. Deeds, and J. G. Mathers, assistant engineers; C. E. Nordeen, junior topographer; A. E. Aldous and G. W. Holland, classifiers; W. N. White, assistant classifier; H. C. McNamara, R. L. Filtzer, and R. O. Helland, junior classifiers.

The force at the end of the year included 36 other permanent employees and 4 temporary employees of various grades. During the year there were 33 additions to and 22 separations of employees on the permanent roll, and 31 temporary clerks not enumerated above were employed for various periods.

FUNDS.

The allotments from the different appropriations amounted for the year 1918 to $87, 400, as follows:

Geologic surveys	$18,000
Topographic and forest surveys	7,500
Gaging streams	7,000
Salaries of scientific assistants and skilled labor	4,900
Enlarged and stock-raising homesteads	50,000
	87,400

SUMMARY OF WORK OF CLASSIFICATION.

During the year 9,972,256 acres of lands were classified as to their coal character. Of this amount 626,349 acres were classified as noncoal land and 9,345,907 as coal land. Coal-land withdrawals during the year amounted to only 9,369 acres, and coal-land restorations to 1,105,622 acres. The area withdrawn for classification as to coal at the end of the year was 43,757,488 acres.

New withdrawals of probable oil lands amounting to 171,247 acres were made during the year, and an area of 117 acres was restored because examination determined that the lands were not favorable for the accumulation of oil. The result of the year's work, therefore has been an increase of the area of oil reserves from 6,348,640 to 6,519,770 acres. Indian lands to the amount of 42,097 acres were classified as oil lands.

Phosphate reserves were increased by 217,996 acres during the year as a result of the withdrawal of 248,030 acres in Idaho and the restoration of 30,034 acres in Montana. The area withdrawn on June 30, 1918, was 2,724,394 acres.

During the year the Secretary, on the recommendation of the Geological Survey, designated 5,161,080 acres of land as nonirrigable under the enlarged-homestead acts. The designations of 445,083 acres, which were found to have been erroneously designated, were canceled, the result being a net increase in this classification of lands of a little more than 4,600,000 acres during the year. At the end of the year 280,349,858 acres were classified as being not susceptible of irrigation. The number of petitions for such designation available for action during the year was 13,435, of which 8,020 were acted upon; 5,415 were awaiting action at the end of the year.

The first designation of stock-raising lands under the stock-raising homestead act was made on November 28, 1917, but by the end of the year 7,538,962 acres of land had been so designated as the result of field examination and office study. The number of applications for stock-raising homesteads available for action during the year was 49,033. Of these, nearly 15,000 were closed as a result of the year's work and nearly 10,000 in addition had been considered and were ready for formal action at the end of the year.

Withdrawals of lands believed to be available for power sites aggregated 137,505 acres, and restorations of lands previously withdrawn but found to be without value for power amounted to 2,230 acres. The increase of outstanding withdrawals from 2,429,097 to 2,564,372 acres was the net result of these actions, and 109,508 acres of Oregon & California Railroad grant lands in Oregon were classified as power-site lands.

During the year areas amounting to 4,756 acres were withdrawn as public water reserves and 1,830 acres were eliminated from such reserves The net increase in lands withdrawn as public watering places was from 201,708 to 204,634 acres.

CORRESPONDENCE.

During the year 66,219 letters and petitions were received by the land-classification board. In addition, some 2,700 copies of correspondence from various bureaus were sent to the board for its information and files; this material is made up largely of copies of General Land Office letters to registers and receivers of local land offices, of reports made by agents of the General Land Office, and of copies of departmental decisions. In the same period 10,789 letters, reports, acknowledgments, and notifications were prepared in the board. For the working days of the year these figures show a daily average of about 217 for the incoming and 35 for the outgoing mail.

PUBLICATIONS.

In 1916 a report entitled "Petroleum withdrawals and restorations affecting the public domain," containing all orders of petroleum withdrawals and restorations to September 30, 1916, was published as Bulletin 623. Since that date the President has approved a number of additional orders for withdrawals and restorations and has created two naval oil-shale reserves, and the Survey has undertaken to publish descriptive lists of the lands affected by these orders in the form of press statements. The demand for this information has been so great that the Survey's reserve stock of the two lists published prior to the current fiscal year was soon exhausted. In order to make this information readily available these two lists were republished in February, 1918, as Press Bulletin 355, and in April, 1918, a supplemental list was published as Press Bulletin 363.

COOPERATION WITH THE GENERAL LAND OFFICE.

The cooperation between the General Land Office and the Geological Survey by which the Survey's information on the value for mineral and water resources of lands sought under the public-land laws is made available to the department through the General Land Office was continued during the fiscal year along the same lines as in previous years. The Survey received during the year 4,106 requests from the General Land Office for information as to the mineral character or the relation to water supply of public lands sought and furnished information in 3,871 cases. It also received for consideration 1,434 reports on field examinations made by the General Land Office and acted on 1,390 reports of this character.

At the beginning of the fiscal year there were pending 1,561 cases involving the mineral character of lands. The number of mineral cases received during the fiscal year is slightly greater than that of the cases acted on, so that the pending cases at the end of the year number 479 more than at the beginning. The cases received involving both mineral character and water resources also outnumber the cases acted on, so that the pending cases of this class at the end of the fiscal year number 449 more than at the beginning. The total number of cases covered by the cooperative agreement with the General Land Office pending at the end of the year is 1,762, or 177 more than the number pending at the beginning of the year. Of the pending cases 232 are concerned only with the mineral character of the land, 13 only with the water resources, and 1,517 with both mineral character and water resources.

During the year numerous applications for classification of lands included in withdrawals were received. A number of requests were sent to the Survey for the classification of lands as to mineral or power-site possibilities, and a large number of applications of other types were referred for consideration and report. These are considered in more detail in the sections on hydrographic and mineral classifications.

The following table shows the year's record in the several classes of cooperative cases, including those discussed above and including also requests for the designation of lands under the enlarged-homestead and stock-raising homestead acts and other miscellaneous cases.

General summary of cooperative cases, fiscal year 1917-18.

Class.	Pending June 30, 1917.	Received, 1917-18.	Disposed of, 1917-18.	Pending June 30, 1918.	Gain (+) or loss (−).
Mineral character only:					
General Land Office requests for information	60	108	148	20	+ 40
General Land Office field service reports	426	580	794	212	+ 214
Applications for classification as to mineral	38	158	133	63	− 25
	524	846	1,075	295	+ 229
Water resources only:					
General Land Office requests for information	6	9	14	1	+ 5
General Land Office field service reports	18	17	23	12	+ 6
Cases in national forests	6	15	17	4	+ 2
Applications for reclassification as to water resources	18	90	90	18	....
Applications for rights of way	72	289	315	46	+ 26
Lists under Carey act	....	6	6	....	....
Desert-land proofs under irrigation projects	66	58	90	34	+ 32
Petitions under enlarged-homestead acts	7,209	6,226	8,020	5,415	+ 1,794
Applications under stock-raising homestead act	3,002	46,031	14,384	34,649	−31,647
	10,397	52,741	22,959	40,179	−29,782
Mineral character and water resources:					
General Land Office requests for information	981	3,703	3,525	1,159	− 178
General Land Office field service reports	73	551	389	235	− 162
General Land Office requests for information as to water resources, accompanied by Forest Service reports as to mineral character	21	286	184	123	− 102
Indian Office requests for information	8	59	52	15	− 7
	1,083	4,599	4,150	1,532	− 449
Grand total	12,004	58,186	28,184	42,006	−30,002

MINERAL CLASSIFICATION.

COAL.

Regulations.—No changes in the coal regulations have been made; all coal valuations continue to be made under the regulations adopted in 1913, as modified on February 16, 1915 (43 L. D., 520), requiring classification to be made by quarter-quarter sections and surveyed lots.

Withdrawals and restorations.—The total area of coal land withdrawn during the year was only 9,369 acres, about 544,000 acres less than was withdrawn last year. This area lies in New Mexico, in the Gallup coal field, and for the most part was not previously known to contain coal. A small part of the area was at one time withdrawn by the Secretary of the Interior but had not been included in a withdrawal by the President. A total of 1,105,622 acres in eight States was released from withdrawal and made available for purchase under the coal-land laws as rapidly as field work and classifications were completed. The restorations during the year therefore exceed the withdrawals by 1,096,000 acres.

Coal withdrawals and restorations, fiscal year 1917–18, in acres.

	Outstanding June 30, 1917.	New withdrawals, 1917–18.	Restorations, 1917–18.	Outstanding June 30, 1918.
Arizona	141,945			141,945
California	17,643			17,643
Colorado	4,503,417		5,041	4,498,376
Idaho	338,452		333,691	4,761
Montana	10,912,569		300,457	10,612,112
Nevada	83,833			83,833
New Mexico	5,603,894	9,369	27,019	5,586,244
North Dakota	14,656,455		423,954	14,232,501
Oregon	4,361			4,361
Utah	5,326,256		12,181	5,314,075
Washington	827,193		3,119	824,074
Wyoming	2,437,723		160	2,437,563
	44,853,741	9,369	1,105,622	43,757,488

In addition to the foregoing withdrawals and restorations under the provisions of the act of June 25, 1910 (36 Stat., 847), as amended August 24, 1912 (37 Stat., 497), 1,560 acres in the Nenana coal field, Territory of Alaska, were reserved by proclamation of the President on January 26, 1918, in accordance with the provisions of the act of October 20, 1914 (38 Stat., 741), and 238,082 acres of classified coal land in the Fort Berthold Indian Reservation, N. Dak., were restored by the Secretary on December 4, 1917.

Classification.—The work of examining and eliminating from withdrawal as rapidly as possible areas of doubtful coal value was continued during the year, although not on as large a scale as in previous years, owing to the demand for other work more directly connected with the war. These noncoal classifications have been made in Colorado, Idaho, Montana, New Mexico, North Dakota, Utah, Washington, and Wyoming.

During the fiscal year 9,345,907 acres have been classified as coal land, of which 9,033,797 acres lie in North Dakota; and more than 626,000 acres were classified as noncoal. An area of 9,972,256 acres was therefore classified with respect to coal value, an increase of more than 9,600,000 acres over the area similarly classified during the preceding year.

In the first of the following tables the classifications made during the year are summarized by States. In the same table the classifications are divided into two groups—reclassifications, which constitute a revision of previous classifications, and new classifications, which comprise the classifications of withdrawn areas or areas not previously considered. The sum of classifications in these two groups represents the total classification. The net increase or decrease in total areas classified in any State, as shown in the last two columns, is obtained directly from the other columns of the table.

Land classified as coal and noncoal land, fiscal year 1917-18, in acres.

State.	Total classification.			Reclassification.		New classification.		Net increase or decrease.	
	Coal.	Noncoal.	Total.	Previous noncoal now coal.	Previous coal. now noncoal.	Coal.	Noncoal	Coal.	Noncoal.
Colorado	3,887	1,662	5,549	80	....	3,807	1,662	+ 3,887	+ 1,582
Idaho	2,490	335,331	337,821	....	....	2,490	335,331	+ 2,490	+335,331
Montana	276,380	45,209	321,589	932	943	275,448	44,266	+ 275,437	+ 44,277
New Mexico	8,420	19,298	27,718	....	....	8,420	19,298	+ 8,420	+ 19,298
North Dakota	9,033,797	....	9,033,797	333,521	....	8,700,276	....	+9,033,797	−333,521
Oregon	320	....	320	....	....	320	....	+ 320	....
South Dakota	6,437	11,686	18,123	6,437	11,686	....	....	− 5,249	+ 5,249
Utah	12,181	....	12,181	....	....	12,181	....	+ 12,181	....
Washington	806	2,393	3,199	80	....	726	2,393	+ 806	+ 2,313
Wyoming	1,189	210,770	211,959	1,000	210,770	189	....	− 209,581	+209,770
	9,345,907	626,349	9,972,256	342,050	223,399	9,003,857	402,950	+9,122,506	+284,299

NOTE.—A classification in the Nenana coal field, Alaska, not included in above totals, amounted to 52,452 acres of noncoal and 109,445 acres of coal not priced.

Classifications of coal and noncoal land, June 30, 1918, in acres.

State.	Classifications outstanding June 30, 1917.		Net result of classifications, 1917-18.		Classifications outstanding June 30, 1918.		
	Coal.	Noncoal.	Coal.	Noncoal.	Coal.	Noncoal.	Total.
Arizona	....	42,492	....	....	....	42,492	42,492
Arkansas	60,715	70,038	....	....	60,715	70,038	130,753
California	8,720	228,502	....	....	8,720	228,502	237,222
Colorado	3,362,466	9,355,748	+ 3,887	+ 1,582	3,366,353	9,357,330	12,723,683
Idaho	2,113	7,986,925	+ 2,490	+335,331	4,603	8,272,286	8,276,889
Montana	5,621,322	21,759,039	+ 275,437	+ 44,277	5,896,759	21,808,316	27,700,075
Nevada	5,880	2,428	....	....	5,880	2,428	8,308
New Mexico	675,097	2,733,702	+ 8,420	+ 19,298	683,517	2,753,000	4,436,517
North Dakota	2,375,992	2,180,855	+9,033,797	−333,521	11,409,789	2,847,334	14,257,123
Oregon	17,124	1,062,095	+ 320	....	17,444	1,062,095	1,079,539
South Dakota	250,123	6,956,108	− 5,249	+ 5,249	244,874	6,961,357	7,206,231
Utah	1,075,571	3,307,091	+ 12,181	....	1,087,752	3,307,091	4,394,843
Washington	148,620	1,582,536	+ 806	+ 2,313	149,426	1,584,849	1,734,275
Wyoming	7,622,965	15,281,320	− 209,581	+209,770	7,413,384	15,491,090	22,904,474
	21,226,708	74,498,879	+9,122,506	+284,299	30,349,216	74,783,178	105,132,394

Area and valuation of coal lands June 30, 1918.

State.	Appraised coal land June 30, 1917.	Coal land appraised, 1917-18.		Net result of appraisals, 1917-18.	Total appraised coal land outstanding June 30, 1918.	Total valuation of appraised coal land outstanding June 30, 1918.	Average value per acre.
		Total coal land appraised.	Coal land reclassified as noncoal land and re-withdrawn.				
	Acres.	*Acres.*	*Acres.*	*Acres.*	*Acres.*		
Arkansas..........	60,715	....	....	....	60,715	$1,473,762	$24.26
California..........	7,720	....	....	....	7,720	585,086	75.70
Colorado..........	2,877,487	3,887	....	+ 3,887	2,881,374	195,522,340	67.85
Idaho..........	2,113	2,490	....	+ 2,490	4,603	89,624	19.47
Montana..........	5,506,779	276,380	943	+ 275,437	5,782,216	137,365,396	23.70
Nevada..........	5,880	....	....	....	5,880	117,600	20.00
New Mexico..........	657,145	8,420	....	+ 8,420	665,565	16,349,351	24.56
North Dakota..........	2,375,992	9,033,797	....	+9,033,797	11,409,789	199,382,666	17.40
Oregon..........	6,875	320	....	+ 320	7,195	128,051	17.79
South Dakota..........	250,123	6,437	11,686	− 5,249	244,874	2,711,462	11.07
Utah..........	1,057,450	12,181	....	+ 12,181	1,069,631	45,088,853	42.01
Washington..........	1,060	806	....	+ 806	1,866	38,520	20.64
Wyoming..........	7,448,096	1,189	210,770	− 209,581	7,238,515	387,802,633	53.50
	20,257,435	9,345,907	223,399	9,122,508	29,379,943	986,655,344	30.20

Applications for classification as to coal.—During the present year the Survey received 81 applications for classification; 62 of these were requests for classification as coal land and 19 as noncoal land. There were also pending at the beginning of the year 28 applications for coal classification and 3 for noncoal. Of the total 112 received and pending cases, 75 were acted on—55 as coal and 20 as noncoal. At the end of the year there were pending 37 requests for classification, of which 35 were for coal and 2 for noncoal.

OIL.

Withdrawals and restorations.—The examination and withdrawal of the public lands with reference to their prospective value for deposits of petroleum and natural gas was continued during the year in Colorado, Montana, North Dakota, South Dakota, Utah, and Wyoming. The examinations were made for the purpose of determining the advisability of adding new areas to the oil reserves wherever the data indicated the presence of oil. These examinations, together with reconsideration of data on file in the light of new information obtained from various sources, resulted in eliminating from withdrawal 117 acres of nonoil land and adding to the withdrawals 171,247 acres of prospective oil land, a net increase of 171,130 acres for the year.

For the first time in a number of years there was no action taken on lands in California. In Wyoming 117 acres in Lincoln County were restored to entry, information obtained by the Survey having shown these lands to be barren of oil. The discovery of oil southwest of the Black Hills in the vicinity of Lusk, Wyo., made it advisable to withdraw certain other favorable areas in northeastern and east-central Wyoming previously known to the Survey but not included in an oil withdrawal. An examination made in southeastern Utah, though revealing no favorable structure, indicated the presence of oil in certain strata in which it had not been previously known. On the basis of this new information the President withdrew a small area in Carbon County covering 10,461 acres.

Oil withdrawals and restorations, fiscal year 1917–18, in acres.

State.	Withdrawals outstanding June 30, 1917.	New withdrawals, 1917–18.	Restorations, 1917–18.	Withdrawals outstanding June 30, 1918.
Arizona	230,400			230,400
California	1,257,229			1,257,229
Colorado	87,474			87,474
Louisiana	467,030			467,030
Montana	1,346,105			1,346,105
North Dakota	84,894			84,894
Utah	1,952,326	10,461		1,962,787
Wyoming	923,182	160,835	117	1,083,900
	6,348,640	171,296	117	6,519,819

Classification.—Most of the lands examined and included in oil withdrawals have not been definitely classified as oil lands, and during the fiscal year no such classifications have been made. The lands on which oil is known or believed to be present in commercial quantities have been included in oil withdrawals pending further detailed examinations in order to determine the mineral character of these lands and to hold the lands until legislation providing for their disposition by lease or otherwise is enacted. Lands included in oil withdrawals may therefore be considered tentatively as oil lands, although, with the exception of some of the land in California, they have not been so classified.

On account of the diversion of the field force from the examination of oil-shale lands to other more pressing work, there were no classifications of such lands during the fiscal year. The field examinations made will eventually lead to extension of the classified areas in Colorado and to classifications in Nevada. As the result of previous work, 3,992,036 acres remain classified as oil-shale land.

Applications for classification.—During the year the Survey received 6 applications for classification of lands with respect to oil content. At the beginning of the year there were also pending 6 applications for classification as to oil, making a total for the year of 12 cases. Eleven of these were acted on during the year, and one remained pending at the close of the year.

POTASH.

Search for potash.—Reconnaissance work in search of commercial deposits of potash was continued by the geologic branch of the Survey during the fiscal year. No new areas were withdrawn, and no changes were made in the two existing reserves in California—Searles Lake and Panamint valleys—aggregating 91,207 acres, or in the potash reserves of 39,422 acres at Columbus Marsh, Nev.

Potash leasing act.—The act of Congress approved October 2, 1917, entitled "An act to authorize exploration for and disposition of potassium" (40 Stat., 297), authorizes the Secretary of the Interior, in his discretion, to issue permits giving the exclusive right for two years to prospect for chlorides, sulphates, carbonates, borates, silicates, nitrates, and other salts of potassium on not more than 2,560 acres of vacant public land, and to issue leases for the exploitation of the deposits. Patents may be issued for one-fourth of the area covered by a prospector's permit, if a commercial deposit of potash is discovered. Applications for such prospecting permits are submitted to the Commissioner of the General Land Office, within whose jurisdiction falls the decision as to granting or refusing the permit. In the last two quarters of the fiscal year 70 such applications have been submitted to the Survey for report and recommendation. Action has been taken on 46 of these applications, and the remaining 24 were still pending in the Survey at the end of the year.

PHOSPHATE.

Regulations.—No change in the procedure affecting the classification of phosphate land has been made. Under the regulations defining phosphate lands, adopted by the Survey in 1912 to guide its recommendations for withdrawal and restoration, lands underlain by deposits containing less than 30 per cent of tricalcium phosphate are considered nonmineral lands. Phosphate beds that are from 1 foot to 6 feet or more in thickness and contain 70 per cent or more of tricalcium phosphate are held to depths ranging from zero along the outcrop to the maximum of 5,000 feet in direct ratio to the variation of the thickness of the bed from 1 to 6 feet. For beds containing less than 70 per cent of tricalcium phosphate the depth limit varies from zero to the depth of a 70 per cent bed of any given thickness in direct ratio to the variation in tricalcium phosphate content from 30 to 70 per cent.

Withdrawals and restorations.—During the year no field examinations of phosphate deposits were made, but 248,030 acres in Idaho and Montana were withdrawn and 30,034 acres in Montana were restored on the basis of field work in other years.

Phosphate withdrawals and restorations, fiscal year 1917–18, in acres.

State.	Withdrawals outstanding, June 30, 1917.	Withdrawals, 1917-18.	Restorations, 1917-18.	Withdrawals outstanding, June 30, 1918.
Florida	119,737			119,737
Idaho	966,377	49,340		1,015,717
Montana	119,227	198,690	30,034	287,883
Utah	302,465			302,465
Wyoming	998,592			998,592
	2,506,398	248,030	30,034	2,724,394

Classification.—Examinations of land in Indian reservations are frequently made for the information of the Office of Indian Affairs. If these examinations are made for the purpose of determining whether the lands contain phosphate, the results are transmitted not as withdrawals or restorations but as classifications either as phosphate or nonphosphate lands. Mineral classifications of certain phosphate lands within the Northern Pacific land grant have been reported to the Commissioner of the General Land Office, but these lands are a part of the phosphate reserves and are included in the table given on page 135.

In addition, therefore, to the classifications that are reported as withdrawals and restorations in the preceding table, direct classifications of lands in the Fort Hall Indian Reservation, Idaho, and the Wind River Indian Reservation, Wyo., have been made as indicated in the following table:

Phosphate classifications of Indian lands outstanding June 30, 1918, in acres.

State.	Phosphate land.	Nonphosphate land.
Idaho	4,080	17,440
Wyoming	20,576	85,515
	24,656	102,955

Applications for classification.—During the fiscal year the Survey received one application for classification of withdrawn lands as nonphosphate land, and one such application was pending at the beginning of the year. One of these was acted on and the other was pending at the end of the year.

METALLIFEROUS LANDS.

Classification.—The Gila River Indian Reservation was examined as to its mineral character in the preceding fiscal year, and on the basis of this examination the lands of the reservation were classified this year—3,235 acres as mineral land and 367,979 acres as nonmineral.

Withdrawals.—No new areas were withdrawn, and no change was made in the mineral-land withdrawal of 8,507 acres in Arizona.

HYDROGRAPHIC CLASSIFICATION.

WATER POWER.

Withdrawals and restorations.—The classification of the public lands with relation to their value in connection with water-power development was continued during the year, the withdrawals being made under the authority conferred by the two acts of June 25, 1910 (36 Stat., 847; 36 Stat., 855, 858), and the act of August 24, 1912 (37 Stat., 497). On July 1, 1917, the area included in outstanding withdrawals was 2,429,097 acres. During the year 137,505 acres additional were withdrawn and 2,230 acres previously included in power-site reserves were restored to the public domain. On June 30, 1918, the total area withdrawn in connection with water power was 2,564,372 acres.

Power sites withdrawn, restored to entry, and outstanding, fiscal year 1917–18, in acres.

State.	Withdrawals outstanding June 30, 1917.	New withdrawals, 1917–18.	Restorations, 1917–18.	Withdrawals outstanding June 30, 1918.
Alabama	120			120
Alaska	69,300	12,235	520	81,015
Arkansas	22,354			22,354
Arizona	300,324	44		300,368
California	264,006	13,217		277,223
Colorado	276,504	10		276,514
Idaho	262,494	3,315	342	265,467
Michigan	1,240			1,240
Minnesota	12,309			12,309
Montana	164,297	195	80	164,412
Nevada	27,361			27,361
Nebraska	761			761
New Mexico	62,602			62,602
Oregon	317,318	105,414	760	421,972
Utah	447,424	204		447,628
Washington	113,780	281	528	113,533
Wyoming	86,903	2,590		89,493
	2,429,097	137,505	2,230	2,564,372

Water-power designations.—The act of June 9, 1916 (39 Stat., 218), revesting in the United States title to lands in Oregon held by the Oregon & California Railroad Co., provides for classification as "power-site lands" of the revested lands found to be chiefly valuable for water-power sites. On June 10, 1918, all the revested lands which had been classified as agricultural lands, this class including all lands not classified as power-site or timber lands, were opened to entry under the homestead laws. During the fiscal year prior to June 10, 1918, 109,508 acres of the revested lands were designated as power-site lands. On June 30, 1918, the total area classified as power-site lands under the provisions of the act referred to was 141,273 acres. In general, such of these lands as were not otherwise withdrawn have also been included in power-site reserves under appropriate acts of Congress. The designation heretofore made of 764,438 acres of land valuable for water power in Arizona and 201,000 acres of such land in New Mexico under the enabling acts of those States remains unchanged.

Applications for reclassification.—At the beginning of the fiscal year 18 applications for the reclassification of lands included in power-site reserves were awaiting action, and during the year 90 were received, making a total of 108 cases. Action was taken on 90 cases, leaving 18 pending at the end of the year.

Right of way applications.—Departmental regulations of January 6, 1913, under the act of Congress approved March 4, 1911 (36 Stat., 1235, 1253), and of March 1, 1913, under the act of Congress approved February 15, 1901 (31 Stat., 790), charge the Geological Survey with important administrative duties in connection with applications for rights of way over the public lands for purposes related to the development of water power. Such applications, when received in proper form at the General Land Office, are forwarded to the Survey for consideration of such matters as relative priority of applications, incompatibility of works, relative beneficial utilization of resources, and the engineering and economic features involved in the applications and permits. If the approval of an application is found to be compatible with the public interest, a draft of agreement is prepared, and a report is made to the Secretary of the Interior on the circumstances in the case. This agreement, after execution by the applicant and issuance of the permit by the Secretary of the Interior, defines the conditions under which the power is to be developed, the tenure of the site, and the provisions for the protection of the public interest as regards distribution of output, rates, and service.

During the year favorable reports were made to the Secretary of the Interior on 21 applications for power permits under the act of February 15, 1901, including 5 applications for preliminary and 5 for final permits involving the development of water power and 11 applications for final permits for electrical transmission lines. Favorable reports were also rendered on 14 applications for grants under the act of March 4, 1911, for rights of way for electrical transmission lines.

Numerous applications involving extensions of time under permits and grants, modifications of stipulations of permittees and grantees, and approvals of transfers of permits and grants have been considered and reported upon to the Secretary. A large amount of correspondence of the Interior Department relative to right of way matters in general has been initiated by the Geological Survey or has been assigned to it for handling.

In pursuance of the Secretary's instructions of August 24, 1916, 32 permittees under the act of February 15, 1901, and grantees under the act of March 4, 1911, to whom permits and grants have been issued by the Secretary of the Interior since January 1, 1913, were called on for detailed reports of their operations during the calendar year 1917. These reports cover the operations of many of the larger power systems of the public-land States and present a great amount of valuable information. The reports show that public lands under permits or grants issued by the Secretary of the Interior since January 1, 1913, were used during the year for the generation or transmission of over 2,000,000,000 kilowatt-hours of electric energy.

As the foregoing statement indicates, the Geological Survey holds an important place in the scheme of governmental administration of hydroelectric power development and transmission on public lands, as it is at present worked out in the Interior Department. A considerable amount of work has been done in the hydrographic division on various aspects of such administration which, although not directly productive of tangible results at this time, will nevertheless prove of great value as a foundation for the more comprehensive consideration of this subject which seems reasonably certain to come.

In addition to applications for rights of way for hydroelectric development, a large number of applications of other types are referred to the Geological Survey for consideration and report. These embrace applications for rights of way for railroads, under the acts of March 3, 1875 (18 Stat., 482), and March 2, 1899 (30 Stat., 990), affecting public lands and Indian reservations, respectively, on which report is made as to whether or not the construction of the railroad will interfere with power or irrigation development on streams in the vicinity of the right of way; applications for rights of way for irrigation uses, under the act of March 3, 1891 (26 Stat., 1095), on which report is made as to interference with power development, the feasibility of the project, and other features; applications for rights of way across national forests for mining, milling, and municipal purposes, under the act of February 1, 1905 (33 Stat., 628); and a variety of miscellaneous applications for domestic, municipal, mining, and railroad water supply.

Applications for rights of way, fiscal year 1917-18.

	Pending June 30, 1917.	Received, 1917-18.	Acted on, 1917-18.	Pending June 30, 1918.
Railroad: Acts of Congress approved Mar. 3, 1875 (18 Stat., 482), May 14, 1898 (30 Stat., 409), Mar. 2, 1899 (30 Stat., 990), etc.	20	57	68	9
Irrigation: Acts of Congress approved Mar. 3, 1891 (26 Stat., 1095), May 11, 1898 (30 Stat., 404), etc.	16	77	86	7
Power: Acts of Congress approved Feb. 15, 1901 (31 Stat., 790), Mar. 4, 1911 (36 Stat., 1235, 1253), etc.	29	26	34	21
Miscellaneous: Acts of Congress approved Jan. 21, 1895 (28 Stat., 635), May 11, 1898 (30 Stat., 404), May 21, 1896 (29 Stat., 127), Jan. 13, 1897 (29 Stat., 404), Feb. 15, 1901 (31 Stat., 790), Feb. 1, 1905 (33 Stat., 628), Mar. 4, 1911 (36 Stat., 1253, 1254), etc.	7	120	127	9
Total number of applications for original consideration	72	280	315	46
Additional applications for reconsideration	21	5	11	15

IRRIGATION.

Reservoir withdrawals.—A number of reservoir sites, valuable principally for the storage of water for irrigation, have been examined by the Geological Survey, and, on its recommendation, the lands they include have been withdrawn from entry.

During the year these withdrawals have been increased by 1,728 acres as a result of an Executive order creating a withdrawal under the act of June 25, 1910, in order to protect possible future extensions of the municipal water-supply system of the city and county of Denver, Colo. This withdrawal was based on a departmental recommendation.

The following table shows the area of such withdrawals outstanding:

Reservoir sites outstanding June 30, 1918.

	Acres.		Acres.
Arizona	23,040	Oregon	10,619
Colorado	1,728	Washington	35,943
Montana	9,080		
North Dakota	1,569		81,979

Carey Act segregations.—During the year three proposed segregation lists under the Carey Act were received for report as to available water supply, general feasibility of plan of reclamation, and mineral character of the lands. Reports on all these lists had been submitted before the end of the year, and supplemental reports on two other lists were also furnished.

Irrigation projects.—The Geological Survey, by instructions of the Secretary of the Interior dated March 15, 1913, furnishes to the Commissioner of the General Land Office information relative to the available water supply and the feasibility of irrigation projects whose water rights or shares are presented as evidence of compliance with the requirements of the desert-land act. During the year 58 such cases were received, and 66 were carried over from the preceding year. Of these 124 cases 90 were reported on and 34 were pending June 30, 1918. Supplemental report was rendered on 1 case, and 5 requests for such reports were pending at the end of the year.

ENLARGED HOMESTEADS.

Classification of lands under the enlarged-homestead acts of February 19, 1909 (35 Stat., 639), June 17, 1910 (36 Stat., 531), June 13, 1912 (37 Stat., 132), March 3, 1915 (38 Stat., 953), March 4, 1915 (38 Stat., 1162), July 3, 1916 (39 Stat., 344), September 5, 1916 (39 Stat., 724), and February 20, 1917 (39 Stat., 925), was continued during the year. As a result of the investigations of surface and ground-water conditions, designations based on Survey classifications have been made during the fiscal year in a large number of cases involving lands regarding which data previously available were insufficient for decision and in many cases regarding which data available indicated that the land was not properly subject to designation.

Action on petitions under the enlarged-homestead acts, fiscal year 1917-18.

State.	Pending June 30, 1917.	Received, 1917-18.	Total.	Action taken, 1917-18.					Pending June 30, 1918.	Cases reconsidered.
				All designated.	Part designated.	Refused.	Recalled.	Total.		
Arizona	100	57	157	86	6	21	4	117	40	15
Arkansas	....	1	1	....	1	....	....	1	....	....
California	387	394	781	190	2	71	65	328	453	13
Colorado	1,223	1,258	2,481	1,493	27	100	94	1,714	767	1
Idaho	1,258	662	1,920	1,031	28	198	100	1,357	563	84
Kansas	35	175	210	171	1	3	6	181	29	11
Montana	878	1,549	2,427	1,733	43	87	43	1,906	521	153
Nebraska	....	1	1	....	1	....	....	1	....	....
Nevada	55	10	65	9	....	15	4	28	37	....
New Mexico	830	464	1,294	619	8	88	79	784	510	45
North Dakota	191	287	478	82	5	16	11	114	364	14
Oklahoma	....	1	1	....	1	....	....	1	....	....
Oregon	500	174	674	88	3	11	16	118	556	6
South Dakota	415	204	619	153	5	35	19	212	407	12
Utah	648	373	1,021	384	15	64	7	470	551	19
Washington	220	168	388	239	1	14	7	261	127	8
Wyoming	469	448	917	337	3	68	19	427	490	33
	7,209	6,226	13,435	6,615	150	781	474	8,020	5,415	414

The general provisions of the acts, which apply in 14 States, permit the entry by one person of 320 acres of "nonmineral, nonirrigable, unreserved, and unappropriated surveyed public lands which do not contain merchantable timber." Entries may be allowed for the surface only of mineral land containing coal, phosphate, nitrate, potash, oil, gas, or asphaltic minerals. As a prerequisite to the allowance of an entry under these acts the land must have been designated by the Secretary of the Interior as not being, in his opinion, "susceptible of successful irrigation at a reasonable cost from any known source of water supply." Under the provisions of sections 6 of the acts of February 19, 1909, and June 17, 1910, applicable in Utah and Idaho only, the Secretary may further designate lands which do not have upon them "such a sufficient supply of water suitable for domestic purposes as would make continuous residence upon the lands possible," and entrymen upon such lands are relieved of the necessity of residence.

Since the enactment of the preference-right amendment to the enlarged-homestead act, on March 4, 1915 (38 Stat., 1162), the entire energy available for enlarged-homestead classification work has been required for considering individual petitions for designation by prospective entrymen. In consequence general designations of large areas are made only in rare instances.

Enlarged-homestead designations, fiscal year 1917–18, in acres.

State.	Outstanding June 30, 1917.	Designations, 1917–18.	Cancellations, 1917–18.	Outstanding June 30, 1918.
Arizona	25,339,047	128,596	....	25,467,643
California	7,212,448	345,425	....	7,557,873
Colorado	26,960,493	904,701	720	27,864,474
Idaho:				
Sections 1-5 only	10,042,677	311,125	290,828	10,062,974
Section 6	124,909	387,928	....	512,837
	10,167,586	699,053	290,828	10,575,811
Kansas	468,139	41,695	....	509,834
Montana	49,520,245	858,066	246	50,378,065
Nevada	46,301,752	3,004	....	46,304,756
New Mexico	28,748,456	1,256,540	16,562	29,988,434
North Dakota	11,495,203	136,182	....	11,631,385
Oregon	17,996,794	155,730	1,605	18,150,919
South Dakota	15,485,989	162,887	....	15,648,876
Utah:				
Sections 1-5 only	7,486,322	51,396	35,898	7,501,820
Section 6	1,333,369	91,305	400	1,424,274
	8,819,691	142,701	36,298	8,926,094
Washington	5,447,144	116,794	....	5,563,938
Wyoming	21,670,874	209,706	98,824	21,781,756
	275,633,861	5,161,080	445,063	280,349,878

A set of State maps showing the areas covered by the designations outstanding June 30, 1918, has been printed.

STOCK-RAISING HOMESTEADS.

The stock-raising homestead law, approved December 29, 1916 (39 Stat., 862), authorizes the Secretary of the Interior to designate unreserved public lands in any of the public-land States, but not in Alaska, as "stock-raising lands." The lands to be designated are those whose surface is chiefly valuable for grazing and raising forage crops and which do not contain merchantable timber, are not susceptible of irrigation from any known source of water supply, and are of such character that 640 acres are reasonably required to support a family.

The appropriation for the administration of the law was made available just before the end of the preceding fiscal year, but it was not until the later part of August that the first field party could be assembled, organized, and equipped. Additional parties were organized and assigned to work in the several States as rapidly as qualified men could be obtained, but data sufficient to make classification in any State were not received until late in the fall.

In the meantime the office force was put under great pressure by reason of the large number of petitions for designation which were filed immediately on the passage of the act and transmitted to the Survey beginning practically with the fiscal year. Only 3,000 petitions were pending on July 1, 1917, but they were received at an average rate of about 6,000 per month for the next six months, and at the end of the fiscal year a total of more than 49,000 had been received. A great amount of work was necessarily involved in recording and filing these petitions and assigning them to the proper field parties.

The first designation was approved November 28, 1917, and thereafter the classification work progressed rapidly until the end of the fiscal year, when more than 7,500,000 acres had been designated in eight States.

During the year there were closed in the records of the Survey more than 14,000 cases, or nearly 30 per cent of the total number filed, and of these nearly 11,000, or more than 75 per cent of those acted on, received favorable consideration. In addition there were, at the end of the year, approximately 9,800 cases which had been approved for designation by the land-classification board but for which formal recommendation had not been made to the Secretary. Final action in these cases was delayed pending receipt from the General Land Office of notification of the action on proposed stock driveways in the areas concerned.

The following table shows the status of stock-raising petitions and the area of land designated as subject to entry under the law:

Designations and action on applications under the stock-raising homestead act, fiscal year 1917-18.

State.	Pending June 30, 1917.	Received, 1917-18.	All designated.	Part designated.	Refused.	Recalled.	Total.	Pending June 30, 1918.	Area designated (acres).
Arizona	118	1,084	....	....	17	74	91	1,111	....
Arkansas	....	1	....	....	....	....	....	1	....
California	203	2,232	....	....	23	144	167	2,268	....
Colorado	350	5,716	2,472	....	117	294	2,883	3,183	1,432,766
Idaho	48	3,031	....	....	13	153	166	2,913	....
Kansas	24	172	38	....	5	44	87	109	15,384
Montana	567	7,455	101	....	25	732	858	7,164	55,588
Nebraska	16	86	83	....	....	1	84	18	38,648
Nevada	58	101	....	....	....	....	....	159	....
New Mexico	141	10,335	2,463	2	211	523	3,199	7,277	2,188,698
North Dakota	261	435	326	....	132	38	496	200	190,797
Oklahoma	....	77	....	....	....	2	2	75	....
Oregon	407	3,012	....	....	14	203	217	3,202	....
South Dakota	532	2,849	1,877	1	242	159	2,279	1,102	1,156,220
Utah	8	1,364	....	....	8	41	49	1,323	....
Washington	90	610	....	....	1	26	27	673	....
Wyoming	179	7,471	3,341	3	105	330	3,779	3,871	2,460,902
	3,002	46,031	10,701	6	913	2,764	14,384	34,649	7,538,962

NOTE.—Ten petitions were returned to the Survey for reconsideration.

PUBLIC WATER RESERVES.

Section 10 of the stock-raising homestead act of December 29, 1916 (39 Stat., 862), provides that lands containing water holes and other bodies of water needed or used by the public for watering may be reserved under the provisions of the act of June 25, 1910 (36 Stat., 847), and that such lands, whether withdrawn prior or subsequent to the passage of the stock-raising homestead act, shall be open to the public use for such purposes and under such general rules and regulations as the Secretary of the Interior may prescribe so long as the withdrawal may be continued in force. While no general rules or regulations for their use have been issued, the creation of public water reserves has been continued under the authority thus expressly recognized as having been granted to the President by the withdrawal act of June 25, 1910. Some public water reserves contain stock-watering places which control surrounding areas of open public range, and it is regarded as desirable that permits be issued to use such withdrawn watering places under conditions that will result in greater protection for public grazing privileges by limiting the number of head of stock grazed to the carrying capacity of the range or otherwise.

During the year all cases referred to the Survey from the General Land Office under the cooperative agreement with that bureau were considered with the view of determining whether the lands affected in any case should and could properly be included in a public water reserve. In a considerable number of these cases the data available were insufficient for decision on this question and field examination was necessary. These examinations have been made by field agents of the Survey or the General Land Office.

At present about 950 watering places consisting of springs, creeks, and other sources of water supply have been considered, and nearly 900 of these are now included in public water reserves. During the year 4,756 acres have been withdrawn and 1,030 acres have been restored, making a net increase of 2,926 acres in the area withdrawn.

Public water reserves withdrawn from entry and restored to entry, fiscal year 1917–18, in acres.

State.	Withdrawals outstanding July 1, 1917.	New withdrawals, 1917-18.	Restorations, 1917-18.	Withdrawals outstanding June 30, 1918.
Alaska	(a)			(a)
Arizona	12,438	628		13,066
California	52,474			52,474
Colorado	480			480
Idaho	7,210			7,210
Montana	3,304	1,940		5,244
Nevada	4,336	417		4,753
New Mexico	2,286	640		2,926
Oregon	2,482			2,482
Utah	33,827	1,080	280	34,627
Washington	40			40
Wyoming	82,831	31	1,550	81,312
	201,708	4,756	1,830	204,634

[a] Not known.

WELL-DRILLING RESERVES.

The sundry civil act of June 12, 1917 (40 Stat., 105), appropriating funds for gaging streams and determining the water supply of the United States, provided that "$25,000 may be used to test the existence of artesian and other underground water supplies suitable for irrigation in the arid and semiarid regions by boring wells." In the administration of this act certain tracts were selected by the Geological Survey on which to drill test wells, and in order to protect these tracts while the tests were being made, two small reserves were created under the authority of the act of June 25, 1910 (36 Stat., 847), as amended August 24, 1912 (37 Stat., 497). Well-drilling reserve No. 1 withdrew from entry 40 acres of public land in south-central Montana. Well-drilling reserve No. 2 withdrew from entry 80 acres of public land in the Steptoe Valley, Nev.

PUBLICATION BRANCH.

DIVISION OF BOOK PUBLICATION.

SECTION OF TEXTS.

During the year 23,880 pages of manuscript were edited and prepared for printing, and proof sheets comprising 3,864 galley proofs and 16,519 page proofs were read and corrected. Indexes were prepared for 40 publications, covering 29,731 pages. Brief notices of the publications issued during the year are given on pages 12–30.

This section assisted in the translation from the French of the "Manual for the artillery orientation officer," published during the year.

At the end of the year eight persons were employed in this section. The water-resources branch has continued to render special assistance in preparing copy and reading proof.

SECTION OF ILLUSTRATIONS.

The number of illustrations prepared was 1,660, comprising 167 maps, 442 photographs prepared for reproduction, 488 diagrams and sections, 415 paleontologic drawings and photographs, and 148 miscellaneous illustrations. The illustrations sent to the printer were reproduced by chromolithography, photolithography, the photogelatin process, halftone engraving, zinc etching, wax engraving, copper etching, and cuts already engraved, a total of 1,316 subjects. Proofs to the number of 1,462 were examined. Electrotypes of 16 cuts were furnished to outside applicants. At the end of the year material for illustrating 30 reports was in preparation.

DIVISION OF DISTRIBUTION.

Editions of 225 new books and pamphlets, 8 reprinted books and pamphlets, 1 new geologic folio, 5 new geologic maps, 101 new or revised topographic maps (including 24 colored photolithographs), 184 reprinted topographic maps, 2 new photolithographed maps, and 12 reprinted photolithographed maps, making a total of 538 publications, were received during the year. Many other special pamphlets and forms prepared for administrative use were received and distributed.

The total units of all publications received numbered 466,428 books and pamphlets, 8,704 folios, 494 geologic maps, 703,338 topographic and other maps, a grand total of 1,178,964.

The division distributed 565,440 books, 11,215 folios, and 530,761 maps, a total of 1,107,416, of which 8,350 folios and 354,459 maps were sold. The total amount received and deposited in the Treasury as the result of sales of publications was $25,491.84. The sales of topographic and geologic maps amounted to $24,639.89, of topographic and geologic folios to $851.95. The division received and answered 70,646 letters.

DIVISION OF MAP EDITING.

SECTION OF GEOLOGIC MAPS.

The work on geologic folios having been discontinued because the engraving division was occupied with more urgent work closely related to the exigencies of the war, little progress was made in the publication of folios during the year. Only material in progress of engraving or printing was finished.

One folio (Deming, N. Mex.; Folio 207) was issued early in the year before work was stopped, and three other folios (Colchester-Macomb, Ill.; Newell, S. Dak.; and Herman-Morris, Minn.) were nearly completed. The Elkton-Wilmington (Md.-Del.), Black Hills (S. Dak.), and Syracuse-Lakin (Nebr.) folios were in various stages of progress.

During the year G. W. Stose, the geologist in charge of the section, edited geologically the illustrations, including maps and color guides, for 51 reports.

SECTION OF TOPOGRAPHIC MAPS.

At the beginning of the year 130 topographic maps were on hand for publication, and the accessions during the year were 116, making a total of 246 maps. Of these, 1 was withdrawn for additional field work, 2 were combined with maps of adjoining quadrangles, 100 have been published, 121 are in press, and 22 have not yet been transmitted to the engraving division. Of the 103 maps published during the year (see list, pp. 30–31) 72 are new engraved maps, 26 are photolithographs, and 5 are new combinations or new editions of engraved maps. The following statement shows the comparative status of map editing and map publication on June 30 for the last five years:

Progress of map publication for five years ended June 30, 1918.

	1914	1915	1916	1917	1918
Published during the year	102	107	153	95	103
In process of engraving and printing	69	57	97	111	121
In hand for engraving	114	91	52	19	22

The manuscripts edited during the year comprise 75 maps prepared for engraving, 19 maps for photolithography, 4 maps of army cantonments, 181 maps or sheets for the illustration of 34 Survey reports, and corrections for 199 maps about to be reprinted. The proof read comprises 113 new topographic maps and corrections to 91 old maps. The index maps for 2 circulars of the series 9–323 were revised and reprinted, and 4 of the State circulars were revised and reprinted.

DIVISION OF ENGRAVING AND PRINTING.

TOPOGRAPHIC MAPS AND FOLIOS.

During the fiscal year 24 special new topographic war maps were photolithographed and printed in black and colors, and 2 special maps showing Army cantonments (Camp Dix, N. J., and Camp Sherman, Ohio) were compiled and printed; 72 topographic maps were engraved and printed, the Harrison, Ohio, fractional map having been combined and printed as a part of the Hamilton, Ohio, map; 2 new State maps (Idaho and Wisconsin) were photolithographed and printed in black; new editions of the United States map showing coal fields, United States map showing oil and gas fields, and the La Moure, N. Dak., topographic map were issued, making a total of 103 new maps printed and delivered.

Corrections were engraved on the plates of 192 maps, and 11 were in hand for correction. Of the 192 corrected maps, 122 were intended for reprint editions, 59 were in hand for printing, and 11 were corrected for other purposes. Twelve photolithographic State maps were corrected and reprinted, and reprint editions of 59 maps in hand at the beginning of the year were completed. Editions of 3 maps without corrections were also reprinted.

Of the new and reprinted maps 299 different editions, amounting to 703,338 copies, were printed and delivered to the map room. This is an increase of 60 editions and a decrease of 78,306 copies from the preceding year.

One new geologic folio (Deming, N. Mex.) was published during the year. Folio and State editions of the Leavenworth-Smithville, Mo.-Kans., folio and octavo editions of the San Francisco and Detroit folios were also issued during the year. Editions and partial editions amounting to 8,704 copies were printed and delivered, and extra areal-geology sheets of the different folios, amounting to 494 copies, were also printed and delivered.

OTHER GOVERNMENT MAP PRINTING.

The following war work was done for different branches of the War Department and Navy Department and for other branches of the Government: For the Signal Corps, maps of Belgium, conventional map signs (British and French), map showing military cable and telegraph system Washington to Alaska, map of Fort Monroe and vicinity (1:24,000), outline maps of the United States, drawing of Lewis machine gun, and other miscellaneous work; for the General Staff (War Plans Division), charts showing system of liaison in a division; for the Engineer School, base map of the United States, transfers and sample tint patterns; for the Office of the Chief of Engineers, map of French sector (Aincourt), metric tables, transfers, and stipple patterns; for the Office of Chief of Ordnance, United States base map and other miscellaneous work; for the Army War College, map showing methods of carrying lines of information; for the Surgeon General's Office (Sanitary Corps) and the Chemical Warfare Service, a considerable amount of miscellaneous work; for the Council of National Defense, plates for weekly reports of Bureau of Statistics; for the Navy Department, diagrams of Curtiss airplane; for the Bureau of Construction and Repair, camouflage ship designs and other miscellaneous work; for the Bureau of Standards, illustrations for confidential war report; for the Bureau of Mines under appropriations for war materials investigations, "Chemical plant No. 4," "Gas defense and gas investigations," and a large amount of miscellaneous work.

The following war work was done through the topographic branch: Eight forms, Army and military data; War Department Map No. 809; Army index map; 24 motor-truck route maps; 25 aviation maps; map showing region of Vailly, France; plan of destruction; artillery firing diagram; map of Fort Omaha balloon field; 9 French Mission maps; map of Camp De Lassigny; and 24 special topographic military maps, photolithographed in three or four colors.

For the Government Printing Office the following items were printed and delivered: Illustrations for Preliminary Report No. 6 of the Commission on Navy Yards and Naval Stations (H. Doc. 1946, 64th Cong., 2d sess.); the annual reports of the governor of Alaska, the governor of Hawaii, the Commissioner General of Immigration, the Commissioner of Indian Affairs, the Superintendent of National Parks, and the Superintendent of the Coast and Geodetic Survey; Department of Commerce Special Publication 44, Department of Agriculture Bulletin 680, Bureau of Education Bulletin 32 ("Work of the natives of Alaska"); soil surveys of San Fernando area, Cal., San Diego area, Cal., Dodge County, Nebr., Ringgold County, Iowa; American Ephemeris and Nautical Almanac, 1918 and 1921; Plane-table manual (Appendix 7, report of the Superintendent of the Coast and Geodetic Survey, 1905); Interstate Commerce Commission Reports, vol. 24; Norway Coast Report, Office of Naval Intelligence Publication 25; Atlas of American Agriculture, Part II (Climatology); Geological Survey Bulletins 655, 658, 659, 660-C, 660-F, 661-B, 661-D, 661-H, 662-A, 662-B, 662-C, 667, 669, 670, 675, 680, 690-B, 691-A, 691-B, 691-C, 691-D, 691-G, 691-H, Professional Papers 100, 106, 107, 108-J, 108-L, 109, 110, 120-C, 120-F; Water-Supply Papers 400, 417, 426; Mineral Resources, 1916; chapters on cement and gypsum. In addition, the following separate illustrations were printed and delivered to the Government Printing Office: For the Navy Department, "A secret and confidential report," Vols. I and II; for the War Department, War Document 653 (confidential); War Document 647 ("Artillery operations of the 9th British Corps at Messines, June, 1917"; for the Department of the Interior, diagram of one national monument; for the General Land Office, map of the Oregon & California Railroad lands in Oregon, cross-section paper; for the National Park Service, geologic map of Rocky Mountain National Park, general-information circulars of seven national parks; for the Department of Agriculture, outline maps of the United States by counties and States, 2-sheet map of the United States, maps of the United States on scales of 1:12,200,000 and 1:17,100,000, outline maps of the world, maps showing quarantine for Texas fever of cattle, map showing life zones of New Mexico, and protractor diagrams.

The following work was done for other bureaus and departments: For the General Land Office, 1,387 township plats, 718 mineral plats, 13 State maps showing homesteads, plats of seven town sites, 135 plats of various grants and reservations, and other miscellaneous work; for the Office of Indian Affairs, maps of two Indian reservations, plats of four town sites, and other miscellaneous work; for the National Park Service, seven automobile guide maps, map showing national parks and monuments, two maps showing proposed enlargements of national parks, and other miscellaneous work; for the Forest Service, recruiting posters, maps of 61 national forests, four recreation maps, five atlas folios, 16 proclamation diagrams of national forests, allotment-estimate forms, grazing-data chart, homestead-entry plats, wall map, account record forms, wood fuel labels, and other miscellaneous work; for the Reclamation Service, general maps of 7 projects, farm-unit plats of 6 projects, and other miscellaneous work; for the Fuel Administration, 13 coal-zone maps, tables of figures, and other miscellaneous work; for the Hydrographic

Office, 84 British Admiralty charts, 147 hydrographic charts, and other miscellaneous work.

Miscellaneous work was also done for the Interstate Commerce Commission, Weather Bureau, Bureau of Mines, Department of the Interior, International Boundary Commission, States Relations Service, Bureau of Standards, Department of Labor, Eight-Hour Commission, Post Office Department, Bureau of Foreign and Domestic Commerce, Bureau of Lighthouses, United States Food Administration, Railway Wage Commission, and Department of Commerce.

This work for various branches of the Government amounted to about $100,000, for which the appropriation for engraving and printing geologic maps was reimbursed by transfer of credit on the books of the United States Treasury.

Work was also done for the Corps of Engineers, United States Army (Professional Memoirs); Public Utilities Commission, Augusta, Maine; Matthews-Northrup Works, Buffalo, N. Y.; Atchison, Topeka & Santa Fe Railway Co.; New York State College of Agriculture at Cornell University, Ithaca, N. Y.; H. E. Hale, engineer, Eastern Group, Federal Valuation of the Railroads in the United States, New York, N. Y.; Arthur B. Bibbins, Catoosa, Tenn.; State Department of Health, Augusta, Maine; State Geological Survey, Urbana, Ill.; and Eastman Kodak Co., Rochester, N. Y.; and the money received in payment for the work, amounting to $469.45, was turned into the Treasury of the United States, to be credited to miscellaneous receipts. On requisition of the Government Printing Office, 740 transfer impressions were made and shipped to contracting printers. Under cooperative agreements transfer impressions were furnished without charge to the State geological surveys of New York, Kentucky, Illinois, Virginia, Massachusetts, West Virginia, Maryland, and Iowa.

A large amount of miscellaneous work relating to the map publications was also done, including index circulars and lists of geologic folios, topographic maps, and State maps.

Of contract and miscellaneous printing of all kinds, 2,560,388 copies were printed. Including topographic maps and geologic folios a grand total of 3,272,430 copies were printed and delivered during the year.

PHOTOGRAPHIC LABORATORY.

The output of the photographic laboratory consisted of 25,818 negatives, of which 1,761 were wet, 1,186 dry, 1,631 paper, and 21,240 field negatives developed; 400 lantern slides; 337 negatives made for photolithographs; 4,025 zinc plates; 171 zinc etchings; 137 celluloids; and 86,416 prints, of which 52,756 were maps and diagrams and 33,660 were photographs for illustrations. In addition, 397 prints were mounted and 1 lantern slide was colored.

ADMINISTRATIVE BRANCH.

EXECUTIVE DIVISION.

The work in the executive division was of the same general character as during the fiscal year 1917, except that the work of the shipping and receiving clerk was retransferred to the division, and the work of the appointment clerk was consolidated with that of the Secretary's Office.

Mails, files, and records.—During the year 142,783 pieces of mail, of which 1,890 were registered, were opened and referred. In addition, 156,425 letters were received direct by the other divisions, making a total of 299,208, an increase of 9 per cent compared with 1917.

Of the letters opened in this division, 16,971 contained $27,438.87 remitted for Survey map publications, a decrease of 37 per cent in number of letters and a decrease of $9,315.01 in amount compared with 1917.

The recording, referring, filing, and mailing of correspondence required the services of 10 clerks. The number of letters mailed through the division was 144,474, a decrease for the year of 47 per cent. This number does not include the outgoing registered mail, which numbered 7,118 pieces, nor 261,424 pieces of letter mail sent direct from other divisions. The total for the Survey was therefore 413,016, a decrease of 27 per cent for the year.

Personnel.—The roll of Secretary's appointees numbered 1,000 at the end of the fiscal year, 66 more than at the end of the fiscal year 1917. There were 234 former employees of the Geological Survey in the military service at the end of the year. The total number of changes in the personnel was 1,891, which included 612 appointments, 546 separations, 652 promotions, 2 demotions, and 79 miscellaneous changes.

During the year 13,947 days of annual leave and 3,825 days of sick leave were granted, being 64 per cent of the amount of annual leave and 17 per cent of the amount of sick leave which it is permissible to grant under the law; 4,174 days of leave without pay were also granted.

Freight and express.—During the year 2,713 pieces of freight and express were handled, of which 1,058 were outgoing and 1,655 were incoming.

SECTION OF FIELD EQUIPMENT.

The section of field equipment is custodian of all field property and of the topographic field record and computation books.

Several hundred new instruments were purchased, consisting principally of transits, telescopic alidades, compasses, and plane-table and traverse tripods.

In addition to furnishing instruments and supplies for the field parties of the Survey, this section, by cooperative arrangement, furnished surveying instruments and supplies to the War Department to the value of nearly $70,000, principally for use abroad.

DIVISION OF ACCOUNTS.

A condensed statement covering the financial transactions of the fiscal year is given below, including disbursements up to August. The unexpended balances of that date largely represent outstanding obligations.

Amounts appropriated for and expended by the United States Geological Survey pertaining to the fiscal year ended June 30, 1918.[a]

Title of appropriation.	Appropriation.	Repayments.	Available.	Disbursements	Balance.
Salaries, office of Director	$35,340.00	$6.67	$35,346.67	$33,545.89	$1,800.78
Salaries, scientific assistants	29,900.00	....	29,900.00	29,899.94	.06
Skilled laborers, etc	20,000.00	....	20,000.00	19,998.83	1.17
Gaging streams, etc	175,000.00	40,165.14	215,165.14	207,440.08	7,725.06
Chemical and physical researches	40,000.00	5,598.43	45,598.43	44,216.76	1,381.67
Preparation of illustrations	18,280.00	....	18,280.00	16,423.17	1,856.83
Mineral resources of United States	75,000.00	58.06	75,058.06	72,692.47	2,365.59
Geologic maps of United States	120,000.00	98,119.75	218,119.75	203,206.89	14,912.86
Books for the library	2,000.00	....	2,000.00	1,662.11	337.89
Topographic surveys	350,000.00	540,056.71	890,056.71	840,369.22	49,687.49
Geologic surveys	350,000.00	10,013.36	360,013.36	346,644.03	13,369.33
Mineral resources of Alaska	100,000.00	7.80	100,007.80	65,315.30	34,692.50
Surveying national forests	75,000.00	2,458.51	77,458.51	49,573.64	27,884.87
Desert watering places	10,000.00	720.00	10,720.00	10,170.10	549.90
Enlarged and stock-raising homesteads	350,000.00	166.18	350,166.18	334,895.11	15,271.07
	1,750,520.00	697,370.61	2,447,890.61	2,276,053.54	[b] 171,837.07

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[a] In addition to these appropriations $175,000 for Survey publications was contained in the appropriation for printing and binding but not disbursed by Survey officials.

[b] The larger part of this balance will be used to pay outstanding obligations.

Classification of expenditures by the United States Geological Survey pertaining to the fiscal year ended June 30, 1918.

Appropriation.	Total.	Salaries and wages	Transportation of persons.	Transportation of things.	Provisions; subsistence and support of persons.	Forage; subsistence and care of animals.
Salaries, office of the Director	$33,545.89	$33,545.89	....	....	....	....
Salaries, scientific assistants	29,899.94	29,899.94	....	....	....	....
Skilled laborers, etc	19,998.83	19,998.83	....	....	....	....
Gaging streams, etc	207,440.08	143,488.48	$13,143.75	$2,050.85	$11,625.70	$655.58
Chemical and physical researches	44,216.76	28,612.83	4,060.68	229.70	3,338.77	332.33
Preparation of illustrations	16,423.17	15,878.33	....	.30	....	....
Mineral resources of United States	72,692.47	66,783.50	1,187.21	68.97	972.94	....
Geologic maps of United States	203,206.89	142,450.25	54.45	2.60	49.40	....
Books for the library	1,662.11	....	....	.80	....	....
Topographic surveys	840,369.22	350,004.65	70,753.82	5,376.16	168,566.47	26,922.04
Geologic surveys	346,644.03	274,774.40	22,297.43	1,141.86	27,657.93	4,625.32
Mineral resources of Alaska	65,315.30	47,048.96	9,193.61	263.68	4,911.21	116.72
Surveying national forests	49,573.64	25,613.98	2,393.12	125.41	7,968.82	6,534.61
Desert watering places	10,170,10	2,288.32	796.24	204.49	1,286.21	101.12
Enlarged and stock-raising homesteads	334,895.11	172,830.20	14,638.33	836.30	63,087.81	2,438.20
	2,276,053.54	1,353,218.56	138,518.64	10,301.12	289,465.26	41,725.98

Classification of expenditures by the United States Geological Survey pertaining to the fiscal year ended June 30, 1918—Continued.

Appropriation.	Communication service.	Printing, engraving, lithographing, etc	Fuel; furnishing heat, light, power, etc.	Special and miscellaneous service.	Materials, miscellaneous supplies, etc.	Stationery, drafting, etc., supplies.
Salaries, office of the Director	....	....	....	....	....	....
Salaries, scientific assistants	....	....	....	....	....	....
Skilled laborers, etc	....	....	....	....	....	....
Gaging streams, etc	$778.41	$1,153.71	$704.71	$2,558.73	$6,247.53	$1,896.40
Chemical and physical researches	118.10	111.15	204.48	2,552.71	2,083.65	245.03
Preparation of illustrations	1.63	253.13	....	....	....	198.02
Mineral resources of United States	1,671.12	1,052.64	....	416.10	5.35	457.34
Geologic maps of United States	90.28	3,417.20	181.30	3,103.16	7,781.75	39,311.27
Books for the library	....	....	....	....	....	701.06
Topographic surveys	1,129.21	15,178.48	7,238.00	8,542.23	15,828.98	12,966.39
Geologic surveys	495.72	3,809.17	612.04	1,796.71	1,163.47	1,323.65
Mineral resources of Alaska	90.30	448.46	744.82	142.24	721.16	218.31
Surveying national forests	8.86	650.99	145.33	176.26	1,147.56	324.42
Desert watering places	52.24	35.90	17.18	234.01	1,137.84	52.28
Enlarged and stock-raising homesteads	1,059.87	1,641.18	146.79	683.79	274.78	4,657.41
	5,495.73	27,752.01	9,994.65	20,205.94	36,392.07	62,351.58

Appropriation.	Equipment (including live stock).	Rent.	Maintenance, operation, and repair of passenger-carrying vehicles.	Purchase of motor-propelled passenger-carrying vehicles.	Purchase of horse-drawn passenger-carrying vehicles.
Salaries, office of the Director	....	....	....	....	....
Salaries, scientific assistants	....	....	....	....	....
Skilled laborers, etc	....	....	....	....	....
Gaging streams, etc	$13,474.51	$1,839.50	$3,418.20	$4,404.02	....
Chemical and physical researches	1,297.96	217.95	287.34	524.08	....
Preparation of illustrations	91.76	....	....	....	....
Mineral resources of United States	77.30	....	....	....	....
Geologic maps of United States	6,756.43	....	8.80	....	....
Books for the library	960.25	....	....	....	....
Topographic surveys	100,943.98	1,797.05	26,700.46	28,326.55	$94.75
Geologic surveys	1,122.88	24.00	3,994.49	1,804.96	....
Mineral resources of Alaska	1,409.83	5.00	1.00	....	....
Surveying national forests	3,811.59	....	672.70	....	....
Desert watering places	2,244.27	....	1,720.00	....	....
Enlarged and stock-raising homesteads	12,639.25	261.60	34,958.44	24,741.16	....
	144,830.01	4,145.10	71,761.43	59,800.77	94.75

During the year the library has been extensively used for war work, the force having been from time to time engaged in aiding Government agencies in investigations that required library research. The war has greatly diminished the number of exchanges received, especially the foreign publications, has made it impossible to distribute the Survey's publications with the usual regularity, and prevented altogether most of the foreign distribution.

The Bureau of Mines in carrying out one of the provisions of its organic act—to disseminate information concerning investigations made—prints a limited free edition of each of its publicatons.

When this edition is exhausted, copies may be obtained at cost price only through the Superintendent of Documents, Government Printing Office, Washington, D. C.

The Superintendent of Documents *is not an official of the Bureau of Mines.* His is an entirely separate office, and he should be addressed:

SUPERINTENDENT OF DOCUMENTS,
Government Printing Office,
Washington, D. C.

The general law under which publications are distributed prohibits the giving of more than one copy of a publication to one person. The price of this publication is 10 cents.

First edition. December, 1918.

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EIGHTH ANNUAL REPORT OF THE DIRECTOR OF THE BUREAU OF MINES.

VAN. H. MANNING, DIRECTOR.

DUTIES OF THE BUREAU OF MINES.

During the fiscal year ended June 30 the Bureau of Mines has given a large part of its time to war work. Established by Congress (37 Stat., 681) in 1910 for the purpose of conducting scientific and technologic investigations concerning mining and the preparation and utilization of mineral substances with a view to the increase of health, safety, and efficiency in the mineral industries, the bureau for eight years has paid especial attention to various problems that became of increased importance after the declaration of war. Among these problems are those relating to poisonous and explosive gases, such as are found in mines, the devising of means to protect men working in noxious atmospheres, the training of men in mine-rescue and first-aid methods, the utilization of coal with greater efficiency, the development of ways to utilize domestic minerals to replace minerals that have been imported, the prevention of waste in the production, transportation, and utilization of petroleum and natural gas, and the development of processes whereby deposits of minerals now unworked may become available as sources of supply. With the experience acquired, the organization that had been built up, and its wide knowledge of mining, milling, and metallurgical practice throughout the United States, the bureau was in a position to conduct many special investigations that had military importance and to cooperate with the various agencies that were participating in the great task of converting the United States from a country engaged in peaceful industry to one seeking to throw its overwhelming strength into this war for the preservation of democracy.

In the latter part of the previous fiscal year an increasing proportion of the work of the bureau had related to some phase of the military problems that were developing. Several urgent technical problems had been undertaken in direct cooperation with the Department of War or the Department of the Navy. The more important of these were the use of gases and of gas masks in warfare, the production of artificial nitrates, and the domestic production of the various minerals that had been largely imported and were liable to be in short supply.

During the past fiscal year the Bureau of Mines has done a great variety of war work. In the course of this work it has cooperated with the Department of War, the Department of the Navy, the Department of Agriculture, the United States Fuel Administration, the War Industries Board, the Capital Issues Committee of the Treasury Department, the Council of National Defense, the War Trade Board, the Emergency Fleet Corporation, the United States Shipping Board, the Bureau of Standards, the National Research Council, and also with other bureaus of the Department of the Interior. Much of this work of the bureau is of such military importance that it can not be described in detail now, but a general summary of the more important features of the work will be found on the following pages. In addition to work on such purely military problems as the use of gases in warfare and such aid in preparing and equipping the Nation's industries for war as the work on nitrates, on war minerals, on the conservation of fuel, and the preparation of special alloys new duties were conferred on the bureau through the act of Congress regulating the manufacture, sale, and use of explosives.

SOME NOTEWORTHY RESULTS OF THE YEAR'S WORK.

Giving as much attention as possible to matters relating to the war, the Bureau of Mines cooperated with Government establishments in solving problems that were of immediate importance to the Nation. The result the bureau has achieved in the war work for the year is as follows:

A great experiment station was developed at the American University, near Washington, D. C., for devising and testing gases and smokes used in warfare, gas masks, flame throwers, incendiary bombs, signal lights, and other war material. At the end of the year this organization was transferred to the War Department as the chemical warfare service.

Through a census of mining engineers; metallurgists, and chemists the bureau aided the Government in obtaining the services of thousands of experts for special duties.

Improved types of gas masks were designed, originating work that was transferred to the Surgeon General's Office of the Army.

The effectiveness of different irritating and poisonous substances for use in bombs, hand grenades and mine throwers was tested.

Many men were trained in the use of gases, smokes, and flaming liquids. A chemical corps established in the National Army in December, 1917, was largely composed of these men.

A staff of chemical engineers was organized to develop processes for manufacturing gases. This was later transferred to the Ordnance

Department of the Army. The bureau began the organization of a unit of men, subsequently transferred to the War Department, for testing gases on a battle scale with artillery.

Through the initiative of the Bureau of Mines the large scale manufacture of toxic gases had made such progress that at the end of the year it was far ahead of the supply of shells.

Mining and milling problems at mineral deposits throughout the country were investigated to ascertain the available supply of metals and minerals especially needed in the conduct of the war.

A body of engineers and chemists was organized as the war minerals investigation, to determine how supplies of necessary commodities, such as nitrates, manganese, chrome, magnesite, nickel, tin, and platinum could be obtained most readily.

In cooperation with the War Department the production of artificial nitrates and the development of processes and plants for their manufacture were studied.

Representatives of the bureau helped to devise a process for the production of nitric acid by the oxidation of ammonia, which is more efficient than any in previous use.

Ways in which the supply of sulphuric acid needed in the manufacture of explosives could be increased were investigated.

A complete survey of the domestic and Canadian nickel deposits was made.

The extraction of molybdenum, tungsten, and vanadium from their ores was investigated with reference to the use of these metals in special steels for munitions and machine tools.

The bureau assisted in procuring from natural gas certain products needed for use in balloons.

The metallurgy of quicksilver ore was studied with reference to the improvement of metallurgical practice. Quicksilver is needed as mercury fulminate in explosives.

Manganese resources of the country were examined with reference to utilizing low-grade domestic ore to replace the high-grade ores formerly imported.

Practice at steel plants was investigated to determine how alloys low in manganese could be most readily substituted for the high-manganese alloys made from foreign ores, which have been used by steel makers in this country.

Chromite deposits were examined throughout the country in order to ascertain how the supply of chrome needed in steel-making and in other industries could be obtained from domestic ores, rather than from ores that were formerly imported.

It was determined that the sulphur mines, pyritiferous ores, and pyrite deposits in this country can supply all the raw material needed by manufacturers of sulphuric acid.

The producing graphite mines of the country were examined and methods of purifying crude graphite were studied to ascertain whether domestic graphite can be used satisfactorily in the manufacture of graphite crucibles.

The bureau cooperated with the War Industries Board in measures to reserve an adequate supply of platinum needed in chemical manufactures for war requirements.

In administering the act regulating the manufacture, sale, possession, and use of explosives during the war about 14,000 carefully selected licensing agents were appointed throughout the United States and its insular possessions; magazines for storing explosives were examined; and numerous prosecutions were started against violators of the provisions of the act.

With the cooperation of manufacturers of explosives a campaign was started to eliminate food products as constitutents of explosives.

Three new mining experiment stations at Minneapolis, Minn., Columbus, Ohio, and Bartlesville, Okla., were established.

During the year 8,851 miners were trained in first-aid and rescue methods at the bureau's mine safety cars and stations as compared with 4,828 in the fiscal year 1917.

Causes of 38 mine accidents, 30 in coal mines and 8 in metal mines, were investigated.

The Gibbs breathing apparatus for protecting men from poisonous or irrespirable gases was further developed by the bureau. In cooperation with the Engineer Corps of the Army, arrangements were made for its manufacture for supplying the mining and sapping regiments, and for commercial sale. Six hundred sets were manufactured during the latter part of the fiscal year and manufacture on a large scale continues.

A large number of coal mines were sampled for the Navy Department, and reports were prepared on the quality of coal and the methods of mining and preparing it for market.

Further tests of the explosibility of coal dust from different mines have given additional information on how coal mine explosions can be prevented or limited.

Tests of a new method of signaling danger to miners underground by the injection of an ill-smelling substance into the compressed-air lines supplying mining machines and pumps have given promising results.

Surgeons of the Public Health Service detailed to the mine safety cars of the Bureau of Mines have surveyed sanitary conditions at more than 150 mines, smelters, and mining towns, suggested improvements, and given talks on health and sanitation.

Tests of explosives to determine their suitability for use in mines and quarries were continued. Three new explosives were approved as permissible for use in dusty or gaseous coal mines, and 6 more were added to the list because of their being similar in all respects to explosives already on the permissible list. At the end of the year there were 160 explosives on this list.

An explosive made of liquid oxygen mixed with carbonaceous material was tested for its value in coal mining.

A new station for testing explosives was erected at the experimental mine of the bureau, near Bruceton, Pa., and methods of analyzing explosives were improved.

Coal mining methods in Oklahoma were studied with reference to the prevention of waste in coal mines on Indian lands.

Black sand deposits in California and Oregon were examined for their importance as possible sources of gold and platinum.

In cooperation with State mine inspection, monthly reports on fatalities at coal mines throughout the country were printed and distributed.

Studies of the combustion of fuel and the baffling of boilers were made in connection with boilers for the Emergency Fleet.

In cooperation with the Bureau of Standards, the Roberts by-products coke oven was tested to determine its commercial worth.

At the request of the United States Fuel Administration, coal mines in Arkansas and Oklahoma were examined and sampled.

As a result of representations made by the Bureau of Mines, Congress authorized the establishment of a Government coal yard, or yards, in the District of Columbia, whence all Federal buildings will be supplied. This yard will be under the supervision of the bureau.

An electric flash lamp, which should be an aid in mine rescue work, was approved for use in explosive mixtures of mine gas and air.

A rocking electric furnace intended to prevent the metal losses that attend the melting of brass and bronze in crucibles was designed and is now in commercial operation.

As an outcome of its work on ferro-uranium, the bureau undertook the preparation of a series of steels containing uranium, tungsten, and molybdenum; these steels are to be tested for their suitability as cannon liners.

Experiments in the electric smelting of manganese ores have shown that usable grades of ferromanganese and silicomanganese, alloys needed in steel making, can be made from low-grade and hitherto unused domestic ores, and with far less difficulty than in a blast furnace.

Reports on labor saving in limestone and cement-rock quarrying were prepared to enable quarry operators to meet the conditions caused by a shortage of labor and a larger demand for cement for Government purposes.

A leaching process and a chloride volatilization process for the treatment of oxidized lead ore have been developed. Tests have shown that the volatilization process can be used for lead sulphide ores.

A cheap and simple process has been developed for recovering zinc from a solution of zinc sulphate, making possible the treatment of low-grade and complex zinc ores by leaching.

Further work on the flotation process for treating ores has indicated the most suitable flotation agents or mixtures for certain ores and has shown why minerals float.

Through field demonstrations operators and well drillers were shown how large wastes of oil underground might be prevented by cementing oil wells so as to prevent water from entering the oil sands.

Results of great significance in the proper valuation of oil lands were obtained by studying the rate of decline of oil wells in nearly all the important producing fields of the country.

Monthly reports on the operations of petroleum refineries throughout the United States, showing the output of the refineries and the amount of crude oil they used, were prepared and distributed.

Results of an investigation of oil storage conditions, and specifications for the construction of steel tanks and concrete reservoirs were published in bulletin form.

Methods for extinguishing and preventing oil fires were investigated. The results are given in a bulletin now in press.

Much detailed information regarding the " topping " of petroleums to recover the lighter hydrocarbons was collected and is now being printed.

Latest practice in the recovery of gasoline from natural gas by compression and refrigeration was described in a bulletin issued, and the recovery of gasoline by absorption methods was investigated.

Special fuels were found that promise to make possible a decided increase in the efficiency of air-craft engines.

Further attention was given to the recovery of oil from the oil shales of Colorado and Utah.

Investigations of the fusing temperature of the ash of different coals have given information of great value to coal users by showing the liability of different coals to clinker.

A simple method was developed for determining small percentages of sulphur dioxide in mine air.

A new method of making a complete analysis of the gases used in warfare was developed.

USE OF GASES IN WARFARE.

BEGINNING OF WORK BY BUREAU OF MINES.

The work the Bureau of Mines is doing on poisonous and explosive mine gases, the use of rescue apparatus and masks, the exploring of noxious atmospheres, and methods of resuscitating persons overcome by bad air had its beginning under the Government about ten years ago. Early in February, 1917, when war between the United States and the central powers seemed inevitable, the Bureau of Mines called the attention of the War Department to the organization and facilities that the bureau had for the study of poison gases, gas masks, etc., and offered these facilities to the War Department for such work. At a conference between representatives of the War College and of the Bureau of Mines the War Department gladly accepted the offer of the bureau and agreed to support the work in every possible way.

The Director of the Bureau of Mines immediately started investigations of these war problems, and until July 1, 1917, carried the work along with bureau funds. The first work was on the development of gas masks. On July 1, 1917, the staff consisted of fifty paid investigators and the work had expanded from gas-masks research to the study of poison gases, and other chemical products used in warfare.

In order to enlist the cooperation of the universities and research institutions in the United States, personal visits were made to practically all of the important ones. The response was most gratifying, and some extremely valuable work has come out of these universities and institutions.

On April 6, 1917, a committee on gases used in warfare was formed by the National Research Council for the purpose of cooperating with the Bureau of Mines in connection with this work, of which Van. H. Manning, Director of the Bureau of Mines, was made chairman. This committee worked in hearty cooperation with the Bureau of Mines. The membership of the committee was as follows: Van. H. Manning, chairman, Director Bureau of Mines; George E. Hale, (ex officio) Director, Mt. Wilson Solar Observatory; R. A. Millikan, (ex officio) Professor of Physics, University of Chicago; Carl L. Alsberg, Chief, Bureau of Chemistry, United States Department of Agriculture; Maj. Earl J. Atkisson, Corps of Engineers, United States Army; Marston T. Bogert, Professor of Organic Chemistry, Columbia University; Bradley Dewey, Chief Research Chemist, American Sheet and Tin Plate Co.; A. H. Marks, Vice President and

Chemical Engineer, B. F. Goodrich Co.; Lieut. Joseph R. Phelps, Passed Assistant Surgeon, Bureau of Medicine and Surgery, United States Navy; Lieut. Col. Earl J. W. Ragsdale, Bureau of Ordnance, United States Army; Lieut. T. W. Wilkinson, Bureau of Ordnance, United States Navy.

Until August, 1917, the Bureau of Mines supervised the construction of gas masks.

Later it was decided that the Bureau of Mines should remain as a research organization, making recommendations to the Army and Navy regarding the masks and gases to be used and the methods of manufacture, and that the construction of the masks proper should be transferred to the Surgeon General's Office of the Army. The organization working for the Bureau of Mines was turned over to this department of the Army and formed the nucleus of the present huge organization working on the construction of gas masks and other appliances for gas defense.

On November 7, 1917, Secretary Lane appointed an advisory board, composed of leading educators in different departments of science, to the Director of the Bureau of Mines on war problems. This board was composed of Dr. William H. Nichols, Prof. E. C. Franklin, Dr. C. L. Parsons, Mr. William Hoskins, Prof. H. P. Talbot, Dr. F. P. Venable, Dr. Ira Remsen, and Dr. T. W. Richards.

From that date this board, both as individuals and as a body, has acted in an advisory capacity to the director on the gas work. The board first met on Monday, December 17, 1917, and held a second meeting May 15 and 16, 1918.

WORK AT THE AMERICAN UNIVERSITY.

In September, 1917, many of the experimenters working for the Bureau of Mines on war-gas problems moved into the present headquarters of the organization at the American University, on the outskirts of Washington. The university authorities turned over the use of two large buildings, rent free, with the provision that some of the alterations and additions, necessary for the proper conduct of the work, would be permanent and become the property of the university after the war was over. The lease of the buildings and grounds of the university extends to a period two years from July 1, 1917, or during the war if it should extend beyond the two-year period.

NEW ORGANIZATIONS DEVELOPED.

In December, 1917, a chemical corps was established in the National Army and a part of the unit was sent to France. This unit was composed largely of men trained in the Bureau of Mines organization.

In December, also, a staff of chemical engineers, working for the research organization of the Bureau of Mines, developing processes for manufacturing gases, was transferred to the Bureau of Ordnance of the War Department and formed the nucleus of the present organization that is building huge plants for the manufacture of poison gases.

Another organization that had its inception under the Bureau of Mines, and has for its head a man who worked for the bureau, is the proving-ground unit of the War Department, established at Gunpowder Neck, Md., for actually trying out gases on an artillery scale.

The research organization also included a group working on chemical warfare devices, such as airplane bombs, signal lights, smoke screens to hide merchant ships from enemy submarines, gas shells, incendiary shells, gas bombs, trench projectors for firing gas bombs, flame throwers, etc. Important recommendations resulting from this research have been adopted by the Army and Navy and utilized in large-scale manufacture.

GASES INVESTIGATED.

Among the irritating and poisonous gases, liquids, or solids that were investigated at the American University experiment station are those first used by Germany—chlorine, bromine, and phosgene (carbonyl chloride); "tear gases," or lachrymators (xylyl and benzyl bromides); "sneezing gases," or sternutators (diphenylchlorarsine); corrosive liquids, such as "mustard gas" (BB dichlorodiethyl sulphide) and "diphosgene" (trichloromethylchloroformate).

RESULTS OF THE WORK.

The Bureau of Mines can fairly claim that because it started this work on gas warfare and received the hearty support of the Army and the Navy Department, the National Research Council, State, educational, and private institutions, the country is months ahead of where it would otherwise have been; American soldiers have gas masks and gases with which to combat the enemy. Further, the developments in gas-mask manufacture by the Surgeon General's Office of the Army, in gas manufacture and gas proving-ground tests by the Bureau of Ordnance, and in the chemical warfare program of the Navy, including the use of smoke screens, shells, toxic gases, etc., are results of this experimental work.

The scientific achievements of the Bureau of Mines have been many, but the results can not be given at this time for obvious reasons. It suffices to say that through the energy of the research organization of the bureau the large-scale production of toxic gases is far ahead of the supply of shells.

The Advisory Chemical Board said of the work being done by the Bureau of Mines: "The efficiency, success, fine spirit, and enthusiasm under the leadership of the Bureau of Mines is a matter upon which we wish to congratulate the bureau, as well as upon the splendid group of unselfish, self-sacrificing men who carried on this arduous and dangerous work."

At that time, before the transfer of the work, the Chemical Board added: "The organization is complex and delicate but well articulated and working with an efficiency and enthusiasm which have impressed us greatly."

TRANSFER TO THE WAR DEPARTMENT.

On June 25, 1918, under the authority given by what is known as the Overman Act, approved May 20, 1918 (Public, No. 152), President Wilson transfered the work being done at American University from the Bureau of Mines to the Gas Service of the Army. The letters given below are self-explanatory.

JUNE 29, 1918.

Mr. G. A. BURRELL,
Assistant to the Director in Charge of Gas Investigations,
Washington, D. C.

MY DEAR MR. BURRELL: I am sending you herewith copy of Executive order of the President of June 25, transferring the Bureau of Mines Experiment Station, American University, to the War Department for operation under the Director of Gas Service of the Army. Will you please report to Gen. Sibert immediately.

May I not express to you and your associates who have been engaged upon these investigations, on behalf of the Secretary of the Interior and myself, our keen appreciation of the faithful and valuable service each of you has rendered in this work. It has been an inspiration to me to have been associated with you, and I feel that under the new arrangements you and your associates will render the same service to the Director of the Gas Service as you did to the Director of the Bureau of Mines.

I am also inclosing a copy of personal letter received by me from the President and copy of Secretary Baker's letter to the President relative to this transfer.

Cordially, yours,

VAN. H. MANNING,
Director.

JUNE 25, 1918.

MY DEAR MR. PRESIDENT: In connection with the proposed transfer of the chemical section at American University from the Bureau of Mines to the newly constituted and consolidated Gas Service of the War Department, which you are considering, I am specially concerned to have you know how much the War Department appreciates the splendid services which have been rendered to the country and to the Army by the Department of the Interior, and especially by the Bureau of Mines under the direction of Dr. Manning. In the early days of preparation and organization, Dr. Manning's contact with scientific men throughout the country was indispensably valuable. He was able to summon from the universities and the technical laboratories of the country men of the highest quality and to inspire them with enthusiastic zeal in attacking new and difficult problems which had to be solved with the utmost speed. I do not see how the work could have been better done than he did it, and the present suggestion that the section now pass under the direction and control of the War Department grows out of the fact that the whole subject of gas warfare has assumed a fresh pressure and intensity, and the director of it must have the widest control so as to be able to use the resources at his command in the most effective way possible. The proposal does not involve the disruption of the fine groups of scientific men Dr. Manning has brought together, but merely their transfer to Gen. Sibert's direction.

Respectfully, yours,

NEWTON D. BAKER.

THE PRESIDENT.

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26 JUNE, 1918.

MY DEAR DR. MANNING: I have had before me for some days the question presented by the Secretary of War involving the transfer of the chemical section established by you at the American University from the Bureau of Mines to the newly organized Division of Gas Warfare, in which the War Department is now concentrating all the various facilities for offensive and defensive gas operations. I am satisfied that a more efficient organization can be effected by having these various activities under one direction and control, and my hesitation about acting in the matter has grown only out of a reluctance to take away from the Bureau of Mines a piece of work which it thus far has so effectively performed. The Secretary of War has assured me of his own recognition of the splendid work you have been able to do, and I am taking the liberty of inclosing a letter which I have received from him, in order that you may see how fully the War Department recognizes the value of the services.

I am to-day signing the order directing the transfer. I want, however, to express to you my own appreciation of the fine and helpful piece of work which you have done, and to say that this sort of team work by the bureaus outside of the direct war-making agency is one of the cheering and gratifying evidences of the way our official forces are inspired by the presence of a great national task.

Cordially, yours,

WOODROW WILSON.

DR. VAN. H. MANNING,
Chief, Bureau of Mines, Department of the Interior.

EXECUTIVE ORDER.

It is hereby ordered that the experiment station at American University, Washington, D. C., which station has been established under the supervision of the Bureau of Mines, Interior Department, for the purpose of making gas investigation for the Army, under authority of appropriations made for the Ordnance and Medical Departments of the Army, together with the personnel thereof, be, and the same is hereby, placed under the control of the War Department for operation under the Director of Gas Service of the Army.

WOODROW WILSON.

25 JUNE, 1918.

JUNE 29, 1918.

MY DEAR MR. PRESIDENT: I beg to acknowledge receipt of your letter of June 26, relative to your order transferring the Bureau of Mines Experiment Station, American University, to the Gas Service of the War Department, and in accordance with this order the transfer has on this date been made effective.

I take this opportunity of expressing to you, on behalf of my associates and myself, our keen appreciation of the recognition given to this section of our work by you, the Secretary of War, and the Secretary of the Navy.

Cordially, yours,

VAN. H. MANNING,
Director.

THE PRESIDENT.

JUNE 29, 1918.

Maj. Gen. WILLIAM L. SIBERT,
Director of Gas Service, United States Army,
Washington, D. C.

SIR: I am sending you herewith copy of Executive order of the President of June 25, transferring the Bureau of Mines Experiment Station, American University, to the War Department for operation under the Director of Gas Service; this transfer being authorized by the act of May 20, 1918, commonly known as the Overman Act, granting certain powers to be exercised during the period of the war, it is assumed that when the act under which this transfer is made is no longer operative that the gas investigation work will be returned to this bureau, and that it will be permitted to continue its investigations along lines pursued prior to the period of the war.

I am also inclosing a copy of personal letter received by me from the President and a copy of Secretary Baker's letter to the President relative to this transfer.

I am writing a letter to Mr. G. A. Burrell, assistant to the director in charge of gas investigations, requesting him to report to you immediately.

Very respectfully, yours,

VAN. H. MANNING,
Director.

JUNE 29, 1918.

Mr. VAN. H. MANNING,
Director, Bureau of Mines,
Washington, D. C.

DEAR SIR: I have to acknowledge the receipt of your letter of June 29, 1918, inclosing a copy of Executive order of the President transferring the Bureau of Mines Experiment Station, American University, to the War Department.

The newly created Chemical Warfare Service is extremely fortunate in having thus placed at its disposal in this emergency such a complete and efficient research machine as you have created at the American University.

My active interest in the Experiment Station, American University, is confined necessarily to the present emergency.

Very respectfully, yours,

WM. L. SIBERT,
Major General, U. S. Army,
Director Chemical Warfare Service.

With this transfer there passed from under the control of the Director of the Bureau of Mines to that of the Director of the Chemical Warfare Service 1,682 employees who were engaged in the investigations. These employees were classified as follows:

Classification and number of appointees transferred.

	Military.			Civilian.	Grand total.
	Commissioned.	Noncommissioned.	Total.		
Technical	114	596	710	324	1,034
Nontechnical	9	122	131	517	648
Grand total	123	718	841	841	1,682

The total sum allotted by the War and Navy Departments for carrying on the gas investigations under the Bureau of Mines for the fiscal year ended June 30, 1918, was $2,462,000. The allotments and sums disbursed are shown below:

Amounts allotted to and expended by the Bureau of Mines on gas investigations for the War and Navy Departments during the fiscal year ended June 30, 1918.

Source of funds.	Amount allotted.	Amount disbursed.	Balance subject to voucher or claim.
War Department	$2,212,000.00	$2,208,143.60	$3,856.40
Navy Department	250,000.00	249,229.31	770.59
Total	2,462,000.00	2,457,372.91	4,627.09

COOPERATIVE AGENCIES.

In carrying on the gas investigations work a number of universities cooperated by placing laboratories and some of their technical personnel at the service of the Government as follows: Johns Hopkins University, Princeton University, Yale University, Harvard University, Clark University, Cornell University, Masachusetts Institute of Technology, College of the City of New York, Ohio State University, University of Kansas, University of Michigan, University of Wisconsin, University of California, Catholic University.

BALLOON GASES.

As an outcome of the work that the Bureau of Mines has been doing in investigating the utilization of natural gas the bureau has been able to conduct important cooperative work with the War and Navy Departments relating to balloon gases. This work has included the examination of gas fields and the development of apparatus whereby certain products for use in balloons can be obtained from natural gas. Investigation having shown that the natural gas supplied to the cities of Fort Worth, Dallas, and Wichita Falls, Tex., contained these products in sufficient quantities to make recovery practicable, an experimental plant was built at North Fort Worth. This plant is now in operation. Other plants have been constructed, and more will be erected as examinations show in what gas fields these products can be obtained in sufficient quantity to warrant the building of plants for their recovery.

On June 30, 1918, four members of the Bureau of Mines and two officers and 12 civilian employees of the Quartermaster Corps were employed at one of the plants in Texas.

The total sum allotted to the Bureau of Mines by the Army and Navy Departments for this work on balloon gases to June 30, 1918, was $247,000; the amount disbursed was $236,214.96, leaving a balance subject to voucher or claim of $10,785.04.

CHEMICAL PLANT NO. 4.

Another task of military value undertaken by the Bureau of Mines, under an allotment of funds by the Ordnance Department of the Army, was the construction of a large plant at Saltville, Va., for the manufacture of an important compound used in gas warfare. Under an initial allotment of $750,000, afterward increased to $2,800,000, the work of construction of this plant, after designs prepared by the Bureau of Mines, was begun in March, 1918, and has progressed so far that the plant will soon be in operation. This plant, known as Chemical Plant No. 4, will make 10 tons of the product daily. At the end of the fiscal year 41 officers and 33 enlisted men were employed at the plant, and 2 officers and 3 enlisted men at the Washington office.

CARBIDE EXPERIMENTS.

In connection with experiments to test the possibility of manufacturing calcium carbide through the use of a blast of pure oxygen, the Bureau of Mines received an allotment from the War Department of $3,000. Of this amount $553.15 was expended to June 30, 1918, leaving a balance subject to voucher or check of $2,446.85.

INVESTIGATION OF THE OXYGEN BREATHING APPARATUS.

As the Gibbs oxygen breathing mine rescue apparatus, the development of which had been in progress under the Bureau of Mines for several years, had been shown to be superior to any similar device for wearing by men entering poisonous or irrespirable gases the use of the apparatus was recommended to the Army for men engaged in sapping and mining operations. As the Gibbs apparatus had not been manufactured commercially, contracts were entered into by the Engineer Corps of the Army, with which the Bureau of Mines cooperated, with a certain manufacturing company of high standing, to furnish apparatus for the Army and to the public under license from the Bureau of Mines.

On June 30, 1918, nine employees of the bureau were engaged in work connected with this investigation.

WAR MINERALS INVESTIGATION.

THE WAR MINERALS.

Although iron and steel, copper, lead, and zinc are essential in modern warfare, being used in vast quantities, the term "war minerals" is particularly applied to metals and minerals produced in smaller quantities and hitherto largely imported, as the domestic output of many of them was almost negligible before the war.

The importance of these minerals is far greater than is indicated by their output or value. The two fundamental substances for the production of all high explosives are nitrogen compounds, chiefly nitric acid, and concentrated sulphuric acid which is made from pyrite or sulphur. Manganese is needed in the manufacture of steel. Flake graphite is used for making crucibles required for melting brass and crucible steel. Tin is needed for tinware, including tin cans, and for the alloys used as bearing metal. Mercury is required to make the mercury fulminate used in detonators for exploding cartridges and shells. Potash is used chiefly for fertilizer, although smaller amounts are needed for explosives, soap, glass, and various chemicals. Tungsten and molybdenum are essential in high-speed tool steel. Antimony is required for hardening lead and bullets. Chromium is used in tool steel, chromium salts for tanning leather, and chromite for refractory linings of basic open-hearth steel furnaces. Mica is indispensable as an insulating material in electrical apparatus. Magnesite is used as a refractory in metallurgical furnaces. Platinum is needed as a "contact material" in the manufacture of sulphuric acid and in electrical apparatus.

That this country can supply a considerable part of its requirements of these minerals is becoming more evident. The minerals given below are a few of the more notable examples and involve the largest tonnage. In 1913 the United States produced 4,000 tons of high-grade manganese ore; in 1917, 110,000 tons; and in 1918 it may produce 250,000 tons. In 1913 the country produced 340,000 tons of pyrite; in 1917, about 450,000 tons; in 1918 it is expected to produce 500,000 to 700,000 tons. In 1913 the production of chromite was 250 tons; in 1917 about 40,000. In 1913 the output of raw magnesite was 10,000 tons; whereas in 1917 it was 315,000 tons. These figures indicate the rapid expansion of the domestic production in response to war demands. But in 1917 imports from overseas amounted to 650,000 tons of manganese ore, 750,000 tons of pyrite, and 72,000 tons of chromite. As regards our mineral resources, the possibility of a much larger production is very promising.

IMPORTANCE OF A DOMESTIC SUPPLY.

At present every ship that can be spared is needed to carry troops, munitions, and foodstuffs. Importation of minerals from many distant sources involves long voyage, delays in loading, possible loss through enemy attacks, and the congestion of our ports. These minerals represent total imports of several million long tons a year, a large part of which can be eliminated in extreme necessity, and which tend to exhaust the Nation's credit.

Dependence upon foreign sources for mineral supplies may involve the diversion from military services of ships for importing the minerals, for moving fuel, equipment, and supplies to the foreign mines producing these minerals, and possibly transport of those products that the exporting nations may require in return. In view of the uncertainty of such supply, and the urgent need of more ships, it is essential that domestic production be judiciously stimulated.

NEED FOR TECHNICAL INVESTIGATIONS.

Producers of minerals formerly imported are undertaking new operations and need information and assistance to hasten production; consumers, in changing to new materials, need technical assistance. Thus, the use of domestic minerals involves the development of new mines and changes in practice. Technical investigation must precede these changes.

At present there is an urgent need for the correlation of facts relating to new methods and practice and for new investigations to fill gaps in existing knowledge. Both are necessary to keep production for war purposes at the maximum.

Many new mines will be developed. If these new mines are to survive after the war, they must be able to work efficiently and take advantage of the most improved methods. Technical investigations will inform the new operators of the best practice and will show how to overcome the difficulties which make their product less desirable than that which was formerly imported. Through the development of new deposits and better methods and of substitute materials a large part of this new development may become permanent, and thus make the country less dependent on foreign sources for essential minerals.

REVIEW OF WORK IN 1917.

During the latter part of the fiscal year the Bureau of Mines has given increasing attention to phases of the war mineral situation. The director served as a member of the military committee of the Research Council and of the various committees on mineral products under the Council of National Defense. The bureau cooperated with the War Department in an exhaustive study of the production of artificial nitrates; prepared a comprehensive report on the sulphuric acid situation; investigated the possibilities of obtaining pyrite ("coal brasses") from coal mines, and examined a number of the more important pyrite mines. The bureau also made a complete survey of the domestic and Canadian nickel deposits, completed an inventory of the principal available sources of manganese ore, studied the treatment of quicksilver ores with a view to preventing loss of the metal, conducted a cooperative investigation of the recovery of potash from tailing of ore mills in the West, and made a survey of cement plants and blast furnaces as possible sources of potash. In addition the bureau studied the extraction of molybdenum, vanadium, and uranium from their ores with a view to their use in special steels. A census was completed showing the experience and availability for special war work of the chemists, mining engineers, and metallurgists of the country.

EMERGENCY APPROPRIATION.

In March, 1918, Congress appropriated $150,000 under the urgent deficiency bill, to extend and continue the investigations relating to minerals of military importance. The general purpose of this work is indicated by the following excerpt from the act:

> War Materials Investigations: For inquiries and scientific and technologic investigations concerning the mining, preparation, treatment. and utilization of ores and other mineral substances which are particularly needed for carrying on the war in connection with military and manufacturing purposes, and which have heretofore been largely imported, with a view to developing domestic sources of supply and substitutes for such ores and mineral products as are particularly needed, and conserving resources through the prevention of waste in the mining, quarrying, metallurgical, and other mineral industries.

This appropriation permitted organization on a far larger scale, although much work on war minerals had already been undertaken by such of the bureau engineers and chemists as could be diverted to it without endangering other essential work.

DEVELOPMENT OF THE WORK IN 1918.

In July, 1917, the War Minerals Committee was established to undertake a cooperative study of the problems concerned with the war minerals. This committee was composed of William Young Westervelt, representing the American Institute of Mining Engineers and the Mining and Metallurgical Society of America; W. O. Hotchkiss, representing the Association of State Geologists; David White, of the United States Geological Survey, and A. G. White, of the Bureau of Mines. Somewhat later H. S. Mudd became assistant secretary of the committee. This committee cooperated with the different agencies interested in developing domestic mineral resources and promoted the utilization of volunteer services and the most capable engineers for work of special importance.

Another organization, the Joint Information Board on Minerals and Derivatives, was organized to act as a clearing house of information for all of the Government departments interested in mineral problems. Mr. Mudd acted as the representative of the Bureau of Mines on this board.

The Bureau of Mines has endeavored to aid producers of war minerals in regard to matters of priority in transportation, fuel, and equipment, in the construction of highways and roads, in the problem of labor supply, and in a study of mining and milling methods. Summarized reports have been furnished the War Industries Board and the Shipping Board, and the bureau's engineers have been ready to take up any mineral problems confronting the various Government agencies connected with the conduct of the war.

PERSONNEL AND ORGANIZATION.

At the close of the fiscal year the War Minerals Investigation comprised about 100 persons, of whom about 90 were mining engineers, metallurgists, or chemists. Of them about two-thirds were engaged in staff and field work, the remainder, consulting engineers, were used only for short periods and on special problems. The larger part of this organization was formed during the last three months of the year. Parts of the work had been carried out previously under the mining, metallurgical, and mineral technology divisions of the bureau. The investigation was temporarily under the direction of D. A. Lyon, superintendent of stations, assisted by H. S. Mudd and A. G. White. Now it is in charge of J. E. Spurr, as chief executive.

The present general staff consists of H. H. Porter, in charge of priority matters; F. W. Paine, in charge of shipping problems; H. S. Mudd, representative on the Joint Information Board and in charge of matters relating to highways and roads; A. G. White, assistant in matters of organization and planning and of matters relating to excess profits taxes; R. R. Hornor, in charge of mining methods; J. H. McKenzie, in charge of mining costs and ore markets; H. C. Morris, in charge of matters relating to the Capital Issues Committee; J. E. Orchard for mineral control; Oliver Bowles, quarry technologist, and C. T. Robertson, editorial assistant in charge of general information files and the preparation of reports. In addition various specialists have charge of work on the different minerals.

Most of the experimental work of the war minerals investigation is being done at the mining experiment stations of the bureau. The investigations cover the concentration and metallurgy of manganese ores at the Minneapolis station; special high-grade clay products, at the ceramics station at Columbus, Ohio; the recovery and use of pyrite from coal mines, at the station at Urbana, Ill.; potash, tungsten, molybdinum, and rare metals, at the station at Golden, Colo.; concentration and hydrometallurgy of low-grade copper ores, and field investigations of manganese, at the station at Tucson, Ariz.; graphite milling, at the station at Salt Lake City; work relating to the production of sulphur, quicksilver, and chromium, at the station at Berkeley, Cal., and concentration tests of chromium, manganese, quicksilver, and tin ores, at the northwest station, at Seattle, Wash.

MANGANESE.

Practically all the work of the Minneapolis station has been on manganese, especially the concentration and beneficiation of low-grade ores. The work at Minneapolis was under the charge of Edmund Newton, superintendent of the station, who undertook the preliminary organization of all the manganese investigations. H. C. Morris organized the mining-field investigation in cooperation with Mr. Newton. At the close of the fiscal year the manganese work as related to the war minerals investigation was placed in charge of C. M. Weld. W. C. Phalen completed a preliminary investigation of the manganese mines of the country early in the year. In the fall of 1917, through cooperation with the War Minerals Committee and the American Institute of Mining Engineers, a party of engineers made up of Philip N. Moore, A. H. Rogers, R. H. Richards, and F. Lynwood Garrison spent several weeks in studying the mining and washing methods in Virginia and the possibilities for increasing the output from that State. Early in 1918 M. D. Hibbard and J. L. Johnson, consulting engineers, and Edmund Newton, superintendent of the Minneapolis station, investigated the metallurgical practice at steel plants, using low-manganese alloys produced largely from domestic ores. The results indicated that should a shortage of high-grade imported ore develop, a large part of the country's requirements could be met by using low-manganese alloys, as large quantities of low-grade domestic ores are available. In April and May, Albert Burch, for the Bureau of Mines, and E. F. Burchard, for the Geological Survey, investigated the manganese resources of Cuba; they found the output of manganese ore from Cuba would probably increase to about 140,000 tons in 1918.

At the close of the fiscal year W. R. Crane was investigating the Georgia deposits in cooperation with the State Geological Survey; E. R. Eaton was studying the improvement of mining and beneficiation methods in the South; and E. G. Spilsbury, a consulting engineer of the bureau, examined one of the new Virginia districts; C. E. Van Barneveld, superintendent of the Tucson station, was investigating many of the western deposits; G. D. Louderbach was preparing to examine thoroughly the California deposits in cooperation with the United States Geological Survey and State organizations; C. H. Clevenger was studying the recovery of manganese from the ores of the Cripple Creek district; the Minneapolis station was working on a number of new metallurgical processes; and a number of metallurgists were preparing to undertake a more comprehensive survey of the metallurgical problems.

The results of these investigations have shown that during the war a large part of the manganese needed can be obtained from domestic ores. Imports have been curtailed 50 per cent, with the prospect of becoming still smaller. This reduction in imports has been met by the development of new deposits of high-grade ore, by the beneficiation of low-grade ores, and particularly by the use of low-manganese alloys made from these leaner ores.

CHROMITE AND CHROMIUM.

The chromite investigations are under the general charge of J. H. MacKenzie and J. E. Maguire. In the spring of 1918 Albert Burch in cooperation with E. F. Burchard, of the Geological Survey, made a detailed investigation of the chromium-bearing iron ores of Cuba. A thorough investigation of the chromite deposits of California and Oregon is being made under the direction of Albert Burch with the assistance of five field engineers, the samples collected being subjected to concentration tests at the Seattle and Berkeley stations. J. E. Maguire has investigated the Pennsylvania chromite deposits, E. G. Hill the North Carolina deposits, and F. H. Probert the Newfoundland deposits. R. M. Keeney has surveyed the ferrochrome situation, and R. T. Stull and H. D. Hibbard have reported on the use of chromite as a refractory material. Through these investigations a thorough review of chromium and its ores will soon be completed. The results indicate that by increasing the output of domestic ore and by certain restrictions in consumption the country can supply the larger part of its requirements during the war.

PYRITE.

The work on pyrite is under the supervision of H. A. Buehler. A complete survey was made of the producing pyrite mines in Colorado and the Eastern States. C. E. Julihn has investigated deposits in the Southern States, R. R. Horner has done field work in Virginia, New York, Wisconsin, Missouri, and Colorado. In cooperation with the State geological surveys of Pennsylvania, West

Virginia, Ohio, Kentucky, Tennessee, Indiana, Illinois, Michigan, Missouri, and Iowa, E. A. Holbrook is completing a survey of the possible recovery of pyrite at coal mines; tests and analyses of a method of treatment have been worked out at the Urbana station, the results indicating that a large tonnage of pyrite may be obtained from this source. The pyrohotite deposits at Pulaski, Va., have been thoroughly examined.

The recovery of copper from pyrite cinder has been investigated by D. E. Fogg. Tests of cinder from many domestic sources have shown that this cinder can be used in making low-phosphorus iron. In addition to making investigations, the war mineral organization has extended help to mines in the matter of priorities, labor supply, and better mining methods. The work done has clearly shown that the domestic pyrite resources can be developed to meet any possible shortage.

SULPHUR.

In October, 1917, the possible output of the two chief commercial deposits of native sulphur were examined by a party of engineers and geologists. This party was composed of J. Parke Channing, J. W. Malcolmson, and A. B. W. Hodges, consulting engineers of the Bureau of Mines, and W. O. Hotchkiss, representing the War Minerals Committee, and Phillip Smith, representing the United States Geological Survey.

Near the close of the fiscal year examination of the western sulphur deposits was begun to determine their availability as sources of supply. C. O. Lindberg is making the field investigations, and J. M. Hyde is carrying on concentration tests at the Berkeley station.

SULPHURIC ACID.

A. E. Wells, who is in charge of the sulphuric-acid investigations, and has been acting in cooperation with the War Industries Board, visited the plants producing concentrated acid for amunition purposes, and reported on the possibility of using acid from western smelter fumes and on the possible production of elemental sulphur from that source. The acid production of the zinc and the copper smelters in the eastern United States, and the possibility of increasing this output have been studied. Reports have been made in connection with plans for new acid plants for the Government, and the obtaining of raw materials for treatment therein. One of the most important objects of this work is to determine the best methods for meeting the rapidly increasing demand for acid in manufacturing explosives.

D. E. Fogg assisted in the work on sulphuric acid.

GRAPHITE.

The graphite investigations, in charge of G. D. Dub, have included field examinations of producing mines in Alabama, Pennsylvania, and New York, and visits to many plants using graphite, to ascertain the quality needed for satisfactory crucibles. This field work seeks to find the best methods of sampling and analysis to insure a uniform and high-grade product. Samples have been sent to the Salt Lake City station for testing to improve the methods of separating undesirable impurities. The Columbus station has planned an investigation of the extent to which domestic graphite can be satisfactorily used in crucibles.

POTASH.

A. W. Stockett has made a preliminary survey of the sources from which potash is now being obtained, including recovery by electrical precipitation from the dust of cement kilns and blast furnaces, and he has reviewed the methods used in recovering potash from greensands, from the alunite deposits of Utah and from the natural brines of Searles Lake, Cal., and the Nebraska lakes. C. H. Clevenger is doing cooperative work at Colorado Springs on the recovery of potash and manganese from western ores. The production of potash from these various sources has increased rapidly.

QUICKSILVER.

Hennen Jennings, consulting mining engineer, has examined the possibilities of increasing the output of quicksilver mines. Mr. Duschak of the Berkeley station has studied the metallurgy of the ores. At the Seattle station concentrating tests of low-grade ores have been made, as any large increase in the output of mercury must come from the utilization of such ores.

TIN.

H. Foster Bain, assistant director of the Bureau of Mines, is in charge of the work on tin. R. R. Hornor has examined the tin deposits in the Black Hills of South Dakota, and the samples he collected were subjected to milling tests at the Seattle station. Thomas Liggitt investigated the tin area of North and South Carolina, and Howland Bancroft and Charles Janin are preparing a report on tin from Bolivia. There seems to be no prospect of any considerable domestic output of tin ore.

TUNGSTEN, MOLYBDENUM, URANIUM.

The work on tungsten is under the direction of J. H. Mackenzie, assisted by J. E. Maguire. They have surveyed the domestic and foreign situation, including a review of the uses of tungsten. J. H.

Means is making a field examination of the principal tungsten districts. H. W. Gillett has been working on special molybdenum and uranium steels.

ARSENIC.

A. E. Wells has reported on the arsenic obtainable as a by-product from smelters.

PLATINUM.

Hennen Jennings is cooperating with the War Industries Board in the steps taken to reserve an adequate supply of platinum for war requirements. By act of Congress the Bureau of Mines is given authority to control platinum during the war.

CLAYS.

In connection with clay investigations of the Columbus, Ohio, station, A. S. Watts has undertaken a survey of domestic deposits of high-grade clay, with reference to cooperation with the United States Geological Survey and the various State geologists.

ALLOYS FOR SPECIAL STEELS.

Some special work for the Ordnance Department of the Army is being carried out at the Pittsburgh station. This work is related to the use of various minerals in making ferro-alloys and special steels.

EXPLOSIVES REGULATION.

On October 6, 1917, Congress passed the explosives regulation act (Pub. No. 68—H. R. 3932) regulating the manufacture, distribution, storage, use, or possession of explosives and their ingredients. Urgent necessity for the passage of this measure existed in the immediate need of rendering available proper means for protecting the citizens and industries of this country from the careless or malicious use of explosives. The Bureau of Mines was given wide authority under various provisions of the act. Section 13 of the act reads as follows:

> SEC. 13. That the President, by and with the advice and consent of the Senate, may appoint in each State and in Alaska an explosives inspector, whose duty it shall be, under the direction of the Director of the Bureau of Mines, to see that this act is faithfully executed and observed. Each such inspector shall receive a salary of $2.400 per annum. He may at any time be detailed for service by said director in the District of Columbia, or in any State, Territory, or dependency of the United States. All additional employees required in carrying out the provisions of this act shall be appointed by the Director of the Bureau of Mines, subject to the approval of the Secretary of the Interior.

In accordance with this, President Wilson, by and with the advice and consent of the Senate, appointed in each State and in Alaska an explosives inspector whose duty it is, under the instruction of the

Director of the Bureau of Mines, to see that the act is faithfully executed and observed. F. S. Peabody, assistant to the director in charge of explosives, had immediate charge of the administration of the provisions of the act.

An essential feature of the act is the requirement of licenses. No person may sell or possess explosives without holding a license. In order to facilitate the issuing of the licenses to the persons qualified to deal in or use explosives, some 14,000 carefully selected licensing agents were appointed throughout the United States and its insular possessions. Each explosives inspector was provided with an advisory committee whose membership was made up of men representing practically all the activities within that State requiring explosives or their ingredients. These advisory committees, each working in conjunction with its explosives inspector, selected in every county of their State certain men who would act under instruction from the advisory committee and in that way form a state-wide organization.

In the enforcement of this act, the Bureau of Mines has had the hearty cooperation of all Federal, State, and municipal officers and agents. Indeed, legislation has been passed in one State, and is now being proposed in several others, that makes it a misdemeanor, punishable by $1,000 fine, with the removal from office and a change of venue, if any State peace officer neglects to cooperate to the fullest extent with the Federal explosives inspector of that State.

The Bureau of Mines tries to obtain fuller cooperation with mine owners and operators in its endeavor to have workmen supplied with explosives in such manner that they will not be taken into the homes of miners or others, thereby creating unnecessary risk of loss through improper storage facilities and of damage to person or property through carelessness or accident.

Approximately 150 new magazines have been built according to approved specifications. Several thousand old magazines have been remodeled and repaired so as to pass muster.

The number of prosecutions and convictions has been considerably limited by the newness of the law and the time required to organize the necessary field work and to instruct the agents throughout the country. More than 900 cases have been or are now being investigated. Slightly over 30 convictions and sentences have been imposed to date, the heaviest being $5,000 fine and 11 months' imprisonment. Many other cases are pending, waiting the fall and winter sessions of the United States courts. The number of convictions in the past is no criterion of those that will be obtained, as it has been necessary to acquaint the public at large with the provisions of the new law. From now on, however, the policy will be to file a complaint and obtain sentence whenever compatible with justice. Fines rather than imprisonment are sought in order that the man power of the country may not be impaired. When, however, it is advisable to imprison, the bureau does not hesitate to make such recommendation. Services of thousands of the licensing agents throughout the country have been utilized in reporting to the Department of Justice all cases coming under its supervision.

While the appropriation voted by Congress for the enforcement of the explosives act has proved adequate for the performance of the general work anticipated, it has not sufficed for the maintenance of important investigations and for the conduct of unforeseen work that has developed as the organization progressed and showed the responsibilities that logically result from the constructive work already done. In consequence the work of investigation and inspection, which includes investigation of accidents due to explosives, has been restricted to such an extent that it has been necessary to call upon persons less familiar with the explosives, with a resulting inability to obtain all the information that would be pertinent.

As regards magazines and storage places, much excellent work has been done not only to safeguard explosives from theft, but also along lines which would tend toward greater safety of life and property as well as conservation of the explosives themselves. Recommendations have been made to many thousands of users with the result that there is small reason to fear that explosives may fall into the hands of undesirable persons, or that the loss of life, limb, or property may occur. As a result of this work the bureau now possesses first-hand information as to the condition of magazines throughout the country.

With the cooperation of manufacturers of explosives a campaign has been started to eliminate, as far as possible, valuable food products which have heretofore been used in the manufacture of some commercial explosives.

Careful study of the nature and causes of explosions in plants manufacturing high explosives is enabling the bureau to offer helpful suggestions to the manufacturers. These suggestions, when carried out, should lessen to a large degree the possibility of re-occurrence of a like disturbance. The heartiest cooperation exists between this department and the Ordnance Departments of both the Army and the Navy, so that the considerable fund of information being carefully gathered through the explosives regulation is available at all times to them.

On July 1, 1918, the work connected with enforcement of the explosives regulation act, and that being done in the testing of explosives and detonators for their suitability in mining operations, including the determination of the permissibility of explosives for use in dusty or gaseous coal mines, were assigned to the newly-created division of explosives, with Clarence Hall in charge as chief explosives engineer.

The work of this division is divided among three sections, as follows: Explosives regulation, physical testing of explosives, chemical testing of explosives.

COOPERATIVE AGREEMENTS.

In its endeavor to secure the most effective action with State agencies seeking the improvement of efficiency and the lessening of accidents in the mineral industries, the Bureau of Mines, with the approval of the Secretary of the Interior, has made cooperative agreements with State organizations and with State universities and mining schools.

In the past fiscal year investigations as outlined were conducted under the terms of cooperative agreements with the universities, mining schools, and State organizations named below:

University of Arizona, Tucson, Ariz.—Improvement of conditions in the mining, quarrying, metallurgical, and miscellaneous mineral industries, with special reference to the treatment of low-grade copper ores.

Industrial Accidents Commission of California.—Improvement of conditions in mining, quarrying, metallurgical and other mineral industries, safeguarding life among employees, and preventing unnecessary waste of resources.

University of California, Berkeley, Cal.—Improvement of conditions in mining, quarrying, metallurgical and other mineral industries, with special reference to quicksilver and the precious metals; safeguarding life among employees and preventing unnecessary waste of resources.

University of Idaho, Moscow, Idaho.—Investigations aimed at the improving of conditions in the mining, quarrying and other metallurgical industries, with special reference to the losses that take place in the mining and milling of lead and zinc ores; safeguarding life among employees and preventing unnecessary waste of resources.

Colorado School of Mines, Golden, Colo.—Recovery of values from rare metals and from low-grade and complex ores.

University of Minnesota, Minneapolis, Minn.—Improving conditions in the mining, quarrying, metallurgical and other industries, especially in connection with the mining and concentration of iron and manganese ores; safeguarding life among employees and preventing unnecessary waste of resources.

Engineering experiment station of the University of Illinois, Urbana, Ill., and Illinois Geological Survey.—Study of coal-mining methods, means of promoting the safety of coal miners, and methods of utilizing coal.

Ohio State University, Columbus, Ohio.—Increased efficiency in the utilization of mineral substances necessary to the ceramic industry, stimulating and upbuilding this industry and substituting ceramic products of American manufacture for those now imported.

Oregon Bureau of Mines and Geology.—Improvement of conditions in the mining, quarrying, metallurgical and other mineral industries, safeguarding life among employees and preventing unnecessary waste of resources.

State School of Mines of the University of Utah, Salt Lake City, Utah.—Recovery of valuable minerals from low-grade and complex ores, the prevention of waste and the increase of efficiency in the preparation, treatment and utilization of mineral substances.

University of Washington, Seattle, Wash.—Improvement of condition in the mining, quarrying, metallurgical and other mineral industries, safeguarding life among employees and preventing unnecessary waste of resources.

ORGANIZATION OF THE BUREAU OF MINES.

GENERAL OUTLINE.

The Bureau of Mines is charged with the conduct of investigations looking to the increase of health, safety, and efficiency in the mineral industries. When the war came work was concentrated on those problems that seemed most vital to the increase of national efficiency in war time and to the upbuilding of the fighting power of the Nation. Also, in September, 1917, Congress gave the bureau authority to administer the act regulating the use of explosives during the war. Hence, there were many changes in the personnel of the bureau during 1917, and many investigations were temporarily suspended. The five administrative divisions, each in charge of a division chief who reported to the director, were continued during the year. In addition, the work of explosives regulation and the investigations relating to war minerals were both grouped as separate units.

The strictly administrative work at the bureau headquarters in Washington, D. C., continued under the immediate supervision of the director, Van. H. Manning, with F. S. Peabody, assistant to the director, in charge of explosives. H. Foster Bain became assistant director in June, 1918. D. A. Lyon, formerly in charge of the northwest station, was made supervisor of mining experiment stations. The local administration of the Pittsburgh mining experiment station was intrusted to O. P. Hood, chief mechanical engineer. L. H. Duschak, chemical engineer, acted as administrative head of the station at Berkeley, Cal.; R. B. Moore, physical chemist, acted in a similar capacity for the station at Golden, Colo. Edmund Newton, mining engineer and metallurgist, was in charge of the Minneapolis station, and J. O. Lewis, petroleum engineer, was superintendent of the Bartlesville, Okla., station. A. E. Wells, metallurgist, was in charge of the station at Salt Lake City, Utah; Thomas Varley, ore-dressing engineer, was in charge of the northwest station at Seattle, Wash., and C. E. Van Barneveld was supervising engineer and metallurgist of the southwest station at Tucson, Ariz. E. A. Holbrook, mining engineer, was in charge of the station at Urbana, Ill.; R. T. Stull, chief ceramist, was superintendent of the ceramics station at Columbus, Ohio; J. A. Davis, mining engineer, was in charge of the Alaska station at Fairbanks, and C. P. Bowie, petroleum engineer, was in charge of the office in San Francisco, Cal.

F. J. Bailey, chief clerk, had charge of routine administrative matters at the Washington office. J. W. Thompson and P. S. Black, law examiners; and A. H. Fay, mining engineer, charged with the collection of mine-accident statistics, were also stationed in Washington.

Such administrative functions as the general supervision of the bureau's library and the conduct of affairs with respect to publications, personnel, mails and files, supplies, and accounting were centered at the Washington office.

In addition to his other duties, the director has general supervision of the work of the Federal mine inspector for Alaska, and the inspection of coal mines on Indian or Government lands in Oklahoma and Wyoming.

MINING DIVISION.

George S. Rice, chief mining engineer, stationed at Washington, is in charge of the mining division and gives personal attention to the various branches of the work.

D. J. Parker, mine-safety engineer, stationed at Pittsburgh, had charge of mine-rescue operations, the testing of mine-rescue apparatus, the training of miners in first-aid and rescue methods, and the conduct of rescue and first-aid contests.

J. W. Paul, as chief coal-mining engineer, had charge of all field investigations and all work at the experimental mine pertaining to coal mining. The mining engineers in charge of the several districts into which, for purposes of organization, the mining regions of the country are divided are named on pages 43–45.

Sumner S. Smith, mining engineer, served as Federal mine inspector for the Territory of Alaska, with headquarters at Juneau, Alaska.

Special investigations undertaken by the mining division and the names of the officials in charge are outlined below:

Metal-mining safety and health investigations, Mr. Rice.

Tests of methods of preventing explosions and various tests of mine equipment, conducted at the experimental mine near Bruceton, Pa., and in the field, W. L. Egy, physicist.

Physical tests of mine explosives, S. P. Howell, explosives engineer.

Chemical tests of mine explosives, E. J. Hoffman, assistant, and A. C. Fieldner, chemist.

Use of permissible explosives and inspection of coal mines on Indian lands in Oklahoma, J. J. Rutledge, mining engineer.

General health conditions in mines and mining communities, A. J. Lanza, in collaboration with the Public Health Service.

Prevalence and cause of pulmonary disease among miners in the Butte, Mont., district, Daniel Harrington, mining engineer, and Dr. Lanza.

Investigation of recovery of "coal brasses," by Mr. Rice, Mr. Holbrook, Mr. Paul, and others.

Causes and prevention of subsidence from coal mining in certain districts in Illinois, Mr. Rice.

Investigations of coal-mine gases, in cooperation with the State of Illinois, Mr. Holbrook.

Safety methods in Illinois coal mines, W. B. Plank, mining engineer.

Special investigations of metalliferous deposits, R. R. Hornor.

FUELS AND MECHANICAL-EQUIPMENT DIVISION.

The fuels and mechanical-equipment division is under the supervision of O. P. Hood, chief mechanical engineer, stationed in Pittsburgh.

The investigations undertaken or continued during the year and the officials in charge were as follows:

General fuel investigation, Mr. Hood.

Inspection of Government fuel purchases, G. S. Pope, engineer.

Fuel efficiency, Henry Kreisinger, engineer.

Boiler and furnace efficiency in Government plants, S. B. Flagg, engineer.

Electrical equipment in mines, H. H. Clark, electrical engineer.

Mine equipment, Mr. Hood.

Mine rescue apparatus, W. E. Gibbs, engineer of mine-safety investigations.

Tests of safety lamps, Mr. Clark.

Utilization of lignite, E. J. Babcock, assistant engineer.

Analysis of coal purchased for the Government, H. M. Cooper, chemist.

Investigation of coke by-products, J. K. Clement, physicist.

Deterioration and spontaneous combustion of coal in storage, S. H. Katz, assistant chemist.

Investigation of coal-mine hoisting accidents and hoisting equipment, Mr. Hood and R. H. Kudlich, mechanical engineer.

Coking of Illinois coal, F. K. Ovitz, assistant chemist.

Manufacture of illuminating gas, Mr. Ovitz.

DIVISION OF MINERAL TECHNOLOGY.

The work of the division of mineral technology is under the direction of Charles L. Parsons, chief mineral technologist and chief chemist, with headquarters at Washington, D. C. Much of the time of the division was given to problems growing out of the war and many changes were made in the personnel because of the transfer of men to investigations relating to other war work. The following investigations were pursued during the whole or a part of the year:

Metallurgy of radium and radio-active substances and the extraction of radium from its salts, R. B. Moore, physical chemist.

Rare-metals investigations, including the chemical technology of molybdenum, vanadium, uranium, and tungsten, Mr. Moore.

Study of manganese deposits and the mining and technology of manganese, W. C. Phalen, mineral technologist.

Investigation of losses in brass melting, with particular reference to the development of an electric brass furnace; the use of uranium and other rare metals as alloys in steel-making; H. W. Gillett, alloy chemist.

Quarry technology, with special reference to the quarrying of limestone, and cement rock, Oliver Bowles, quarry technologist.

Technologic investigation of ores and mineral substances, Carl E. Julihn, mineral technologist.

METALLURGICAL DIVISION.

The metallurgical division is under the supervision of F. G. Cottrell, chief metallurgist, with headquarters at Washington. The investigations of this division and the officials in direct charge are as follows:

Smelter fumes, including recovery and utilization of sulphur and other substances, A. E. Wells, metallurgist, under the direct supervision of the chief metallurgist.

Treatment of low-grade and complex ores, especially lead and zinc ores in the State of Utah, in cooperation with University of Utah, F. G. Moses.

Hydrometallurgy of gold and silver ores, G. H. Clevenger, metallurgist.

Mining and milling methods for lead and zinc ores, C. A. Wright, metallurgical engineer.

Investigation of the flotation process, W. H. Coghill, metallurgist.

Prevention of waste in the recovery of quicksilver from its ores, L. H. Duschak, chemical engineer.

Treatment of low-grade and complex copper ores, C. E. Van Barneveld, supervising mining engineer and metallurgist.

Concentrating processes for the treatment of low-grade and complex ores, with special reference to the treatment of war minerals, such as the ores of chromium, manganese and nickel, Thomas Varley, metallurgist.

Study of the application of electrometallurgical processes to the treatment of low-grade and complex ores, F. C. Ryan, electrometallurgist.

Recovery of potash and metal values from mill tailings, G. H. Clevenger, metallurgist.

Investigation of blast furnace slags, A. L. Field.

Beneficiation of low-grade manganese ores with special reference to the substitution of domestic for imported ores in the production of ferro-manganese, silica-manganese, etc., Edmond Newton.

Special investigation of problems connected with the production of metals from Alaskan ores, J. A. Davis, mining engineer.

Cooperative work with the Netherlands Government on the Caron process for the recovery of precious metals from ores high in manganese, having for its object the saving of both the manganese and the precious metals, Mr. Clevenger.

The recovery of "coal brasses" (streaks and nodules of "sulphur") as a by-product in the washing of coal, E. A. Holbrook, mining and metallurgical engineer.

PETROLEUM DIVISION.

During the past year the petroleum division has been under the supervision of Chester Naramore, chief petroleum technologist. Much of the work done is so related to the war that it must be regarded as confidential and not subject to discussion. Some of the investigations carried on and the men in direct charge are named below:

Methods for increasing the recovery from oil sands, J. O. Lewis, petroleum engineer.

Manufacture of gasoline from natural gas by the absorption method, W. P. Dykema, assistant petroleum engineer.

Testing of airplane motor fuels in cooperation with the Signal Corps and Dayton Engineering Laboratories Co., Clarence Netzen, chemical engineer, and J. P. Smootz, assistant petroleum chemist.

Methods of excluding water from oil sands in the Mid-Continent fields by the use of cement, W. S. Kyle, M. A. La Velle, and Thomas Curtin, expert drillers; Mr. Lewis, and F. B. Tough, petroleum technologist.

Decline and ultimate production of oil properties, C. H. Beal, petroleum technologist.

Reports on the status of the petroleum industry for the United States Fuel Administration, Mr. Beal.

The probable value of different oil properties within naval petroleum reserves Nos. 1, 2, and 3, Mr. Beal and A. W. Ambrose, petroleum technologist.

The possibility of maintaining and increasing production in the California fields, Messrs. Beal and Ambrose, in cooperation with the California State mining bureau.

The exclusion of water from oil sands in the Illinois field, in cooperation with State Geological Survey of Illinois, Mr. Tough.

Methods of shutting off water in oil and gas wells, Mr. Tough.

A report on the oil-well casing situation for the War Trade Board, Mr. Ambrose and others.

Oil-field water problems and methods of correction, Mr. Ambrose.

Methods of perforating casing and uses of screen pipe, E. W. Wagy, petroleum technologist.

Cooperative work with the United States Land Office in the study of physical conditions of leased lands in the California fields, Mr. Wagy.

The modes of occurrence of gas, oil, and water in different fields, and the factors and relationships controlling these modes of occurrence, R. V. Mills, petroleum technologist.

Refinery statistics, H. F. Mason, petroleum economist.

Report on oil storage and reservoirs (report published), C. P. Bowie, petroleum engineer.

Extinguishing and preventing oil and gas fires (report in press), Mr. Bowie.

Oil-camp sanitation, Mr. Bowie.

Investigations of fuel-oil stations on Pacific and Atlantic coasts, in cooperation with Bureau of Yards and Docks of the Navy Department for recommendations for changes in handling heavy grades of oil, Mr. Bowie.

Methods of topping petroleum (report in press), J. M. Wadsworth, petroleum engineer.

Economy in the use of fuel oil, a pamphlet giving data on fuel oil and its uses (in press), Mr. Wadsworth.

Refinery economies and investigation of fuel economy, Mr. Wadsworth.

Cooperative work with the Submarine Defense Association on testing colloidal fuels, Mr. Wadsworth and W. E. Perdew, chemical engineer.

Preparation of maps and determining elevations in Osage County, Okla., A. R. Elliott, assistant engineer.

Cooperative work with the United States Fuel Administration, Messrs. Bowie, Wadsworth, Perdew, Beal, Ambrose, and Elliott.

Study of fuel for aeroplane engines, E. W. Dean, organic chemist; Mr. Perdew; H. H. Hill, assistant chemist; Mr. Netzen.

Study of gasoline substitutes and improvers, Mr. Perdew.

Investigation of oil shales, Mr. Perdew; D. T. Day, consulting chemist; W. D. Bonner, consulting chemist; M. J. Gavin, assistant refinery engineer.

Study of lubricants for aeroplanes and motor trucks, Mr. Dean and Mr. Hill.

Study of cracking processes, W. A. Jacobs, assistant chemical engineer.

Pitch formation in the intake manifolds of engines, Mr. Hill.

Analyses and tests of oils and products for Bureau of Mines, Panama Canal, Postoffice Department, Signal Corps, Quartermaster Corps, Federal Trade Commission, Bureau of Standards, and motor fuels from Aeronautical Laboratory, United States Navy Yard, Messrs. Perdew and Gavin, and C. R. Bopp, junior petroleum chemist.

Inspection of fuel-oil purchases of the War Department; analyses of crude oil samples; analyses of lubricating oils; and analyses of gasoline samples and miscellaneous products, Mr. Hill, S. M. Brown, analyst, and N. L. Shoop, laboratory aid.

Fuel for automotive apparatus, Mr. Dean.

Convenient electrical heater for use in the analytical distillation of gasoline, Mr. Dean.

The determination of unsaturated hydrocarbons in gasoline, Mr. Dean and Mr. Hill.

Bibliography of the petroleum industry, Miss E. H. Burroughs, editorial assistant.

CHEMICAL-RESEARCH LABORATORY.

The chemical-research laboratory at Pittsburgh is under the supervision of C. L. Parsons, chief chemist.

At this laboratory, in addition to a large amount of routine work for investigations conducted by other divisions, the following special investigations were carried on for various periods of time:

By-product coking and manufacture of nitric acid by oxidation of ammonia, Dr. Parsons, J. D. Davis, chemist; G. B. Taylor, assistant explosives chemist; and J. H. Capps, junior fuel chemist.

Constitution of coal; properties of coal dust and of rock dust, Reinhardt Thiessen, assistant chemist.

Investigation of mine gases and of natural gas, A. C. Fieldner, chemist.

Clinkering of coal and fusing temperature of coal ash, Mr. Fieldner.

WORK OF THE NEW EXPERIMENT STATIONS.

Under the terms of the act of Congress approved March 3, 1915 (40 Stat., 969), three new mining experiment stations, to be under the director of the Bureau of Mines, were established during the year. The cities selected for these stations were Bartlesville, Okla., Columbus, Ohio, and Minneapolis, Minn.

PETROLEUM STATION, AT BARTLESVILLE, OKLA.

In 1915, the total value of the crude oil and natural gas produced in the United States was $242,000,000. In order that the problems relating to the production of natural gas, petroleum, and petroleum products might be studied to best advantage it was decided that one of the three stations to be established in 1917 should be situated in one of the great oil and gas producing areas of the United States, preferably the Mid-Continent field, because of its geographic position and because of its producing more than one-third of the total output of crude oil in the United States and because of the many refineries there. As Oklahoma since 1915 has led all other States in output of crude oil, and as the city of Bartlesville through its Chamber of Commerce was eager to cooperate with the bureau to the extent of donating a site and a fund of $50,000 for the construction of buildings, the station was located at Bartlesville. It is expected that the State of Oklahoma will provide funds for cooperative investigations and that the station will become a laboratory for solving practical problems relating to the increase of efficiency in the petroleum industry.

During the fiscal year just ended work on the station buildings was started, a staff of investigators assembled, and a general plan outlined for the investigations to be pursued. These investigations comprise practical problems, such as formation of oil and water emulsions in wells and the treatment of emulsified oil, characteristics of oil sands and the devising of methods of recovering the maximum quantity of oil from the sands, exclusion of water from oil or gas sands or wells, pumping methods, prevention of loss or waste of oil during storage and transportation, reduction of wastes or losses in refineries.

The personnel of the station includes, J. O. Lewis, superintendent; W. P. Dykema, assistant engineer; and Clarence Netzen and R. O. Neal, assistant chemical engineers.

CERAMICS STATION, AT COLUMBUS, OHIO.

The firms manufacturing clay products in the United States represent an investment of about $375,000,000 or fully one-fourth of the capital invested in crude minerals in the entire country. The value of the clay products exceeds $200,000 annually. For these reasons it was decided that the third of the experiment stations established in 1917 should deal exclusively with problems of ceramics. As Columbus, Ohio, is the center of important clay industries and as the University of Ohio was willing to cooperate with the Bureau of Mines by providing suitable quarters for a station and furnishing funds on the dollar-for-dollar basis for its support, the station was located at Columbus, where it is housed in Lord Hall, one of the buildings of the university. An addition to Lord Hall, to contain several laboratories and a kiln building, is now under construction for the station. The work planned for the year includes the investigation of problems relating to the ceramic industries, the devising of improved methods of refining, manufacturing, and utilizing clays, limestone, feldspar, flint, glass sand, and other ceramic raw materials, and the assisting of manufacturers of ceramic products to reduce the cost and improve the quantity of their product.

R. T. Stull, ceramic engineer, is in charge of the work at this station.

LAKE SUPERIOR STATION, AT MINNEAPOLIS, MINN.

About 88 per cent of the total output (valued at $65,000,000 in 1917) of iron ore in the United States is produced in the Lake Superior district, which comprises the States of Minnesota, Wisconsin, and Michigan, the value of iron ore produced in 1917 in the State of Minnesota alone amounting to $45,000,000. Much of this enormous production comes from large bodies of high-grade ore, but there are vast deposits of low-grade ore. As the supply of high-grade ore may be exhausted in 30 years the problem of beneficiating the low-grade ores so that they can be profitably used in the blast furnace becomes of increasing importance. As Minnesota ranks first among the States producing iron ore, its annual output being nearly three times that of the next State, Michigan, and as excellent opportunities for cooperative work were possible with the University of Minnesota, which through its School of Mines experiment station was already making systematic investigation of such low-grade iron ores, the second of the mining experiment stations established in 1917 was located at Minneapolis.

The problems to be investigated at this station include the concentration of sandy and of cherty hematites, of lean magnetites and titaniferous magnetites, and the concentration of manganiferous ores. Because the steel industry needed at once a large amount of manganese, and as imports of foreign manganese ores were greatly curtailed by the necessity of utilizing ships for transporting troops and supplies to Europe, the obtaining of enough domestic ore had become a problem of pressing importance. For this reason it was decided that the first year's work of the new station should be entirely on manganese.

The offices of the station are now housed in a separate building provided by the university, and the laboratory work is conducted in the buildings housing the State school of mines.

The work at this station is under the direction of Edmund Newton, mining engineer and metallurgist.

MINING DIVISION.

ORGANIZATION.

The work of the mining division is done chiefly in the field, but also includes special testing work in laboratories at experimental stations. George S. Rice, chief mining engineer, stationed at Washington, is in charge of the division.

The administration of the mining division during the fiscal year was carried on through four subdivisions or sections: (1) Safety and rescue work, under the charge of D. J. Parker, mine safety engineer, aided by E. H. Denny, assistant mine safety engineer; (2) explosives testing, in charge of S. P. Howell, explosives engineer; (3) coal-mine investigations, under the charge of J. W. Paul, coal mining engineer, the headquarters of these three sections being at the Pittsburgh station; and (4) metal-mining investigations, under the direct charge of the chief mining engineer.

SAFETY AND RESCUE WORK.

FIELD DISTRICTS OF RESCUE STATIONS AND CARS.

In order to conduct the mine safety work to the best advantage the mining regions of the country are included within eight districts. These districts were planned with special reference to mine safety and rescue work, hence they are grouped around the respective rescue stations and headquarters of the rescue or mine safety cars and do not coincide with the districts of the mining experiment stations of the bureau. The purpose of the two classes of districts are, of course, quite different and the first consideration in locating headquarters of cars and positions of safety stations is one of mine distribution and of available railroad facilities.

District A, termed the North Appalachian district, embraces Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, Connecticut, New Jersey, New York, Pennsylvania, Delaware, Maryland, Virginia, Ohio, and eastern Kentucky. The headquarters are at Pittsburgh, where the work is under the immediate supervision of D. J. Parker. At the Pittsburgh station are training galleries and an auto rescue truck that is used in general training in the vicinity of Pittsburgh. Car 6, with headquarters at Pittsburgh, serves the northern part of the district and car 8, with headquarters at Huntington, W. Va., serves the southern part of the district. The extreme southern part of the district is also served by a safety station in the Federal building at Norton, Va. In this district there were in 1914, 483,023 coal miners and 7,589 metal miners.

District B, termed the South Appalachian district, embraces North and South Carolina, Georgia, Florida, Tennessee, Alabama, and Mississippi. The headquarters are at Birmingham, Ala., where there is a special Bureau of Mines building containing a training gallery, living quarters for a foreman miner, and also shelter for an auto rescue truck that is used for training in the surrounding district. E. B. Sutton, mining engineer, was in charge of the district until his resignation January 15, 1918, the position being vacant for the rest of the fiscal year. The northern end of the district was served by a station at Jellico, Tenn., in the Federal building there. This district in 1914 had 34,930 coal miners and 10,923 metal miners.

District C, called the Lake Superior district, embraces northern Michigan, northern Wisconsin, Minnesota, and the eastern halves of North Dakota and South Dakota. The district headquarters are Ironwood, Mich., where there are a station and car shed presented by the iron-mining operators. Mine safety car No. 7, which serves the district, is of an old type. A steel car should have been in service by the middle of the fiscal year, but war conditions delayed its delivery. The district was in charge of B. O. Pickard, mining engineer, who was transferred from the Washington office. In this district there are 43,051 copper and iron miners, the largest number of metal miners in any of the districts.

District D, termed the Eastern Interior district, embraces Indiana, Illinois, Iowa, southern Michigan, western Kentucky, and the eastern and northern part of Missouri. The district headquarters are at Urbana, Ill., and the district engineer, E. A. Holbrook, is also superintendent of the mining experiment station at Urbana. As the State of Illinois has its own rescue cars and stations, the bureau's safety training was mostly in Indiana except for such cooperative work in Illinois as was carried on from time to time with Mr. Evan D. John, chief of the State department of mines. No. 3 car; one of the older cars, covered the district and had headquarters at Evansville, Ind. A new steel car with headquarters at Terre Haute, Ind., was to have been placed in the district by the middle of the fiscal year, but war conditions have postponed its delivery. In this district there are 135,586 coal miners and 8,526 metal miners.

District E, termed the Southwestern district, embraces the States of Oklahoma, Arkansas, Louisiana, Texas, Kansas, southern Missouri, and eastern Nebraska. J. J. Rutledge, mining engineer, is in charge with headquarters at McAlester, Okla. At McAlester is an excellent brick building presented by the Oklahoma operators, which contains a training gallery. The district is served by mine rescue car No. 4, a wooden car with headquarters at Pittsburg, Kans. In this district in 1914 there were 29,885 coal miners and 5,622 metal miners, the latter working in the mines of the Joplin lead and zinc district.

District F, termed the Southern Rocky Mountain district, embraces Colorado, Utah, New Mexico, southwestern Texas, western Nebraska, and the south half of Wyoming. The headquarters are at Denver, Colo., under the charge of Daniel Harrington, mining engineer, who temporarily has field quarters at Butte, Mont. The district is served by car No. 2, one of the new steel cars, in charge of C. A. Herbert, mining engineer, with headquarters at

Raton, N. Mex. The northern part of the district will be served by another new steel car which was contracted for at the beginning of the fiscal year, but has not been delivered. In this district there are 26,196 coal miners and 14,890 metal miners.

District G, termed the North Rocky Mountain district, embraces the States of Montana and Idaho, southern Wyoming, and the western halves of North and South Dakota; the headquarters are at Butte, Mont., at the Montana School of Mines. The district is under the charge of Daniel Harrington, mining engineer, assisted by C. A. Allen, mining engineer, who is in charge of the new steel safety car No. 5, with headquarters at Butte. In this district in 1914 there were 5,990 coal miners and 21,025 metal miners.

District H, termed the Northern Pacific district, embraces the States of Washington and Oregon and has headquarters at Seattle in the Bureau of Mines experiment station, George Watkins Evans, mining engineer, being in charge. The station has a training gallery and an auto rescue truck which is used for near-by training under the charge of a foreman miner. In this district there are 4,903 coal miners and 1,785 metal miners. For purposes of administration the Territory of Alaska is included in this district.

District I, termed the Southern Pacific district, embraces the States of California, Nevada, and Arizona. This district is in charge of H. M. Wolflin, mining engineer, of the bureau, who also serves as chief mining inspector of the State of California, with headquarters at the office of the California Industrial Commission in San Francisco. The district is served by a new steel rescue car, No. 1, having headquarters at Reno, Nev. This car was in charge of Edward Steidle, mining engineer, until he entered the Army with the rank of lieutenant in the fall of 1917. J. J. V. Forbes, mining engineer, had temporary charge of the car for the rest of the fiscal year. There were only 18 coal miners in this district, but 30,184 metal miners.

The itineraries of the safety cars and training trucks are arranged by the engineers or foremen in charge, with the concurrence of the district engineers and the approval of D. J. Parker, the mine safety engineer in general charge at Pittsburgh.

The testing work of the mine safety section consisted in the testing of mine rescue apparatus of various kinds. At the Pittsburgh station these gallery tests were conducted by G. S. McCaa, mining engineer, under the general supervision of D. J. Parker, during regular schedules of training.

RESCUE AND FIRST-AID INVESTIGATIONS AND TRAINING WORK.

The duties of the engineers, foreman miners, and first-aid miners engaged in first-aid work consisted chiefly in rendering aid at mine disasters, training miners in rescue and first aid, conducting first-aid and mine-rescue field contests, and training soldiers at military camps.

The eight mine-rescue cars, distributed throughout the country, were busy practically the entire year in training miners in first-aid and mine-rescue work. The training done through the stations and the three rescue trucks continued as usual. The three new specially designed all-steel cars, authorized by Congress, are now under construction by the American Car & Foundry Co., at Wilmington, Del. These cars are expected to be in active operation in the early fall.

During the fiscal year 36,274 miners visited the cars, stations, and trucks; 33,629 attended lectures and safety demonstrations; 8,369 were given initial training, 482 additional training, making a total of 8,851 trained.

An important duty of the men engaged in this work is to inspect the rescue apparatus owned by mining companies, and to advise, when requested, on its condition and on the repairs needed. Frequently the apparatus examined is so defective, that, if used in an irrespirable atmosphere at the time of an emergency or disaster, it would probably cause the death of the wearer. The field men always warn operators of such defects, and emphasize the need of having the apparatus examined and tested monthly.

Details of instruction, training, and demonstrations given by the foreman miners and the first-aid miners are shown in the following tables:

Training record for the year ended June 30, 1918.

Cars and stations.	Initial training.				Additional training.				Number of visitors.	Number at lectures.
	First aid and mine rescue.	First aid only.	Mine rescue only	Total.	Mine rescue and first aid.	First aid only.	Mine rescue only.	Total.		
Car 1	68	1,017	255	1,340	5	32	10	47	4,443	[illegible]
Car 2	119	722	219	1,060	5	28	1	34	2,519	[illegible]
Car 3	121	129	94	344	2	2	......	4	4,323	[illegible]
Car 4	63	254	122	439	4	63	39	106	3,302	[illegible]
Car 5	113	1,299	435	1,847	5	67	27	99	3,984	[illegible]
Car 6	100	489	205	794	3	12	13	28	3,062	87
Car 7	61	458	178	697	4	33	19	56	3,107	33
Car 8	101	320	228	649	5	12	6	23	2,819	3,942
STATIONS.										
Pittsburgh	49	183	85	317	......	......	......	......	314	36
McAlester	......	21	......	21	22	......	......	22	3,141	294
Birmingham	27	47	23	97	2	10	11	23	2,767	[illegible]
Jellico	19	192	29	240	......	11	1	12	341	4,087
Norton	2	133	10	145	6	11	......	17	......	......
Seattle	62	213	104	379	......	7	4	11	1,553	3,094
Total	905	5,477	1,987	8,369	41	310	131	482	36,274	33,629

Assignment of personnel of mine rescue cars and stations.

Car or station.	Headquarters.	District engineers.	Surgeons.
Station 2, truck 2	Pittsburgh, Pa	D. J. Parker, E. H. Denny, G. S. McCaa.	
Station 3	Jellico, Tenn		
Station 4, truck 1	Birmingham, Ala		
Station 5	Norton, Va		
Station 6	McAlester, Okla	J. J. Rutledge	
Station 7, truck 3	Seattle, Wash	G. W. Evans	
Car 1	Reno, Nev	H. M. Wolflin, J. J. Forbes	H. M. Thometz.
Car 2	Raton, N. Mex	D. Harrington, C. A. Herbert.	R. C. Williams.
Car 3	Evansville, Ind	E. A. Holbrook, W. B. Plank.	
Car 4	Pittsburg, Kans	J. J. Rutledge	
Car 5	Butte, Mont	D. Harrington, C. A. Allen.	R. R. Sayers.
Car 6	Pittsburgh, Pa	D. J. Parker	
Car 7	Ironwood, Mich	B. O. Pickard	
Car 8	Huntington, W. Va	D. J. Parker	

Car or station.	Foreman miners.	First-aid minors.	Clerks.	Cooks.
Station 2, truck 2	J. H. Zorn	W. Freeman	A. C. Moore	
Station 3	J. M. Webb			
Station 4, truck 1	W. T. Burgess			
Station 5	Jesse Henson	T. R. Williams		
Station 6	W. W. Fleming			
Station 7, truck 3	K. H. Chisholm			
Car 1	J. V. Berry	T. M. Gerety	M. W. Weir	H. L. Hunt.
Car 2	F. Bunnell	J. S. Cunningham.	R. E. Birchard	I. Arthur.
Car 3	G. T. Powell	W. T. Lacy		E. Bonds.
Car 4		J. B. Hynal		J. Esmond.
Car 5	J. Schoning	K. Sparks	S. S. Blum	Bogan.
Car 6	A. J. Nairn	J. Cobbs		W. Colley.
Car 7	E. A. Sporley	J. Matthews		Cunningham.
Car 8	Robt. Lilly	W. H. Forbes		W. Detrick.

States and Towns at Which Mine Rescue and First-Aid Training Was Given by Bureau of Mines Men During the Year Ending June 30, 1918.

Alabama.—Palos, Bessemer, Flattop, Dolomite, Mapine, Maxine, Mulga.

Arizona.—Phoenix, Clarkdale, Humboldt, Ajo, Tucson, Miami, Copper Hill, Globe, Silver Bell, Ray, Metcalf, Horenci, Clifton, Oatman.

Arkansas.—Hartford.

California.—Berkeley, Palo Alto, Martell, Amador, Copperopolis, Shawmut, Melones, Lang, Atolia, Randsburg, Death Valley, Mammoth, Kenneth, Coram, Keswick, Engelmine, Grass Valley.

Colorado.—Colorado Springs, Pikeview, Cameo, Bowie, Somerset, Crested Butte, Walsen, Walsenburg, Aguilar, Twgo, Bowen, Keckler, Cripple Creek.

Idaho.—Mullan, Wallace, Sunset, Mace, Burke, Kellogg, Moscow.

Illinois.—Harrisburg, Berston, Springfield.

Indiana.—Carlisle, Paxton, Terre Haute, Clinton, Jasonville, Linton, Evansville.

Kansas.—Fleming, Yale, Dunkirk, Franklin, Cherokee, Pittsburgh.

Kentucky.—Clay, Nortonville, Earlington, Madisonville, Providence, Stone, Ferndale, Hellier, Offutt, Jenkins, Prestonburg, Dekoven.

Maryland.—Camp Meade.

Pennsylvania.—Fredericktown, Macdonaldton, Meyersdale, Ralphton, Boswell, Curtisville, Connellsville, Republic, Hillcoke, Briar Hill, Jenners, Acosta, Canonsburg, Buffington, Shamokin, Greensburg, Jerome, Hooversville.

Tennessee.—Rockwood, Jellico.

Texas.—El Paso.

Utah.—Salt Lake City, Park City, Bingham, Lark, Milford, Eureka, Sandy, Alta, Scofield, Castle Gate, Hiawatha, Sunnyside, Garfield, Smelter.

Virginia.—Dooley, Dorchester, Toms Creek, Roaring Fork.

Washington.—Pullman, Bayne, Cumberland, Black Diamond, Beekman, Roslyn, Carbonado, Chehalis, Tono, Mendota, Morristown, Seattle.

West Virginia.—Mullens, Stotesbury, Raleigh, Sullivan, Mabscott, Cranberry. Eccles, Lochgelly, Summerlee, Scarboro, Glenn Jean, Harvey, Sun, Dunloop, Minden, Vanetta, Ansted, Williamson, Monongah, Morgantown.

Wyoming.—Rock Springs, Reliance, Superior, Hanna, Diamondville, Sublet, Glencoe, Kemmerer, Cumberland.

The headquarters for each district and the engineers in charge are shown below. When a disaster happens it is customary to notify not only the headquarters at Pittsburgh, but also the district engineer.

District headquarters and engineers in charge.

District.	Headquarters.	Engineer in charge.
A	Pittsburgh, Pa	D. J. Parker, mine safety engineer.
B	Birmingham, Ala	
C	Ironwood, Mich	
D	Urbana, Ill	E. A. Holbrook, mining engineer; W. B. Plank, mining engineer.
E	McAlester, Okla	J. J. Rutledge, mine safety engineer.
F	Butte, Mont	D. Harrington, mine safety engineer.
G	do	Do.
H	Seattle, Wash	G. W. Evans, mine safety engineer.
I	San Francisco, Cal	H. M. Wolflin, mine safety engineer.

FIELD CONTESTS IN MINE RESCUE AND FIRST-AID METHODS.

Below are listed the mine rescue and first-aid contests and field meets held during the past year at which the Bureau of Mines employees were present. Some of these were company affairs, others were intercompany or interstate. Bureau of Mines employees helped arrange and supervise some of the contests and gave competing teams special instructions and training.

First aid and mine rescue contests held during the fiscal year ending June 30, 1918.

Date.	Place.	Kind of contest.		Number of teams.		Number of spectators.	Nature of contest.
		First aid.	First aid and mine rescue.	First aid.	Mine rescue.		
1917.							
July 28	Scottdale, Pa	1		8		800	Intra-company.
Aug. 3	Ishpeming, Mich	1		9		300	Do.
Aug. 26	Cresson, Pa	1		17		350	Y. M. C. A.
Sept. 3	Belle Vernon, Pa	1		2		100	Intra-company.
Do.	Cle Elum, Wash			2		1,800	Do.
Sept. 25	Shenandoah, Pa	1		2		250	Do.
Sept. 26	Minersville, Pa	1		3		300	Do.
Sept. 27	Lykens, Pa	1		7		1,200	Do.
Oct. 4	Nanticoke, Pa	1		13		800	Do.
Oct. 5	Shamokin, Pa	1		18		1,500	Do.
Nov. 5	Williamson, W. Va	1		6			Do.
Nov. 17	Frostburg, Pa	1		15		700	State Mine Department, American Red Cross, U. S. Bureau of Mines.
1918.							
Apr. 6	Big Stone Gap, Va	1		6		100	Intra-company.

ACCIDENTS INVESTIGATED DURING THE YEAR.

The following table shows that 38 accidents were investigated by members of the Bureau of Mines during the fiscal year. In these accidents 188 men were killed, 65 escaped unassisted, and 13 men were rescued through the efforts of volunteer miners, company officials, State mine inspectors, company rescue crews and members of the Bureau of Mines. Of the 38 accidents investigated, 30 were in coal mines and 8 in metal mines.

The accidents investigated may be classified by causes as follows:

CLASSIFICATION OF ACCIDENTS INVESTIGATED.

Gas and dust explosions	11
Mine-car accidents	2
Hoisting accidents	1
Cave-in	4
Rush of water	1
Uncertain	1
Explosion of black powder	2
Fires	8
Misplaced or overcharged holes (including shot-firers' explosions due to "shooting off solid")	6
Asphyxiation from powder smoke	2

Accidents investigated in the fiscal year ending June 30, 1918.

Name of mine	Location.	Date.	Killed.	Injured.	Rescued.	Escaped unassisted.	Number wearing apparatus or apparatus used.	Total hours apparatus worn by all users.	Died wearing apparatus.	Nature of accident.	Inspected by—
Ludlowville shaft rock salt mine.	Ithaca, N. Y	July 10	1	1	1		(a)			Gas explosion	D. J. Parker, Denny, Plank.
Baltic mine	Palatka, Mich	do								Sulphur fire, open pit	Car 7.
No. 7 shaft	Clay, Ky	Aug. 4	62	18		32	8	(b)		Gas explosion	Car 3, Paul Sutton.
Kennedy mine	Cuyuna, Minn	Aug. 25								Mine fire	Car 7.
Sultana mine	Ironton, Mich	Oct. 3				All.	5	12		do	E. A. Sporley, car 7.
E. J. Wyrick	Barbourville, Ky	Oct. 10								do	W. B. Plank.
Flat Top	Flat Top, Ala	Oct. 11	4							Runaway cars	E. B. Sutton.
Mine No. 40	Gowen, Okla	Nov. 12	3				10	(b)		Shot firers', or dust, explosion.	Rutledge, Fleming, McCoubrey.
Eclipse mine	Woods Run, Pa	Nov. 16	2	5		5				Runaway trip	Bourquin, Kudlich.
New North No. 11	Christopher, Ill	Nov. 29	18							Gas explosion	Holbrook, Plank, Powell, car 3.
Zeigler	Zeigler, Ill	Dec. 5		14		All.				do	W. B. Plank.
Dixie Bee	Pimento, Ind	Dec. 12	1	4						Explosion	Do.
Barbour Coal & Coke Co. No. 3 mine.	Catoosa, Tenn	Dec. 20	11			9				Dust explosion from windy shot.	E. B. Sutton.
Wilkeson mine	Wilkeson, Wash	Dec. 26	6	2		2				Fall of ground	G. W. Evans.
Acme mine	Fleming, Ky	Dec. 30		4	2	2				Explosion resulting from blown-out shot.	Bourquin and Webb.
Underwood mine	Scranton, Pa	Jan. 1	1	9						Gas explosion	McCaa.
Mahutska Mining Co	Pitcher, Okla	do	3	1						Hoisting accident	J. J. Rutledge.
Reed Creek Coal Co. Association.	Purcell, Va	Jan. 5	3			3				Explosion	Jesse Henson.
Barnum mine	Pittston, Pa	do	2	15	5					Mine cave	Parker, McCaa, Lilly, Henson, Williams, Denny.
Anderson No. 5 mine	Anderson, Okla	Jan. 12	4							Shot firers' explosion	W. B. Plank.
Allegheny County Home mine No. 4.	Woodville, Pa	Jan. 21								Mine fire	Pittsburgh truck No. 2, McCaa, Freeman, Parker, Denny.
No. 4, Columbia Coal Mining Co.	Poteau, Okla	Jan. 24	(c)							Explosion	J. J. Rutledge.
Lutie No. 4	Lutie, Okla	Jan. 28	2		2		3	6		do	Hynal, Fleming, car 4, Rutledge, McCoubrey.
Dixie Bee	Pimento, Ind	Feb. 4		6		6				Fire	W. B. Plank.

Interstate mine	Banford, Ind	Feb. 21	1							Shot firers' explosion of coal dust.	W. B. Plank.
Amasa Porter	Crystal Falls, Mich	do	17	4	1	3				Rush of water	A. E. Sporley.
Royal mine, Mich	Virden, Ill	Feb. 22	4							Explosion of car of 26 kegs of black powder.	W. B. Plank.
Government mine	Carthage, N. Mex	Feb. 27	1				5	7	1	Mine fire	Harrington, car 2.
Maple Grove No. 4	New Goshen, Ind	Mar. 12	2							Asphyxiation by powder smoke.	W. B. Plank.
Campbell mine	Ford City, Pa	Mar. 16	4	2						Dust explosion	McCaa.
Mountain quarries	El Dorado, Cal	Mar. 21	2							Fall of rock	G. C. Brown.
Mine No. 1	Hartford, Ark	Apr. 9	4	7						Gas and dust explosion caused by blown-out shot.	Fleming.
Deep Vein mine	Terre Haute, Ind	Apr. 23		3						Gas explosion	W. B. Plank.
Mountain King	Mountain King, Cal	Apr. 28	7		1					Poisonous gas from blasting	C. Chester Brown.
Villa mine	Charleston, W. Va	May 20	13			2				Fire	Lilly, Forbes, Parker, McCaa.
Short Mountain Gallery	Lykens, Pa	June 17	3	1	1	1				Fall of ground	Jesse Hensen.
Silver mine (d)	Virginia, Minn	June 27								Powder explosion	Pickard.
O'Gara No. 1	Harrisburg, Ill	June 29	3							Uncertain	Plank, Miller, Lacy.

[a] None used. [b] Not stated. [c] 2 men and 2 children. [d] No information available.

RESCUE AND RECOVERY WORK AFTER MINE EXPLOSIONS AND FIRES.

During the year the value of oxygen breathing apparatus, both for rescue and recovery work after explosions and for fighting mine fires, has been shown on numerous occasions. The use of such apparatus has increased both in the coal fields and in the metal mining districts.

The possibilities and also the limitations of the existing types of the apparatus are being much more generally understood, and recovery and rescue work after mine disasters is becoming largely systematized. At five of the accidents investigated by bureau representatives during the past fiscal year, rescue apparatus owned by the Government was worn during recovery and rescue work. One fatality happened when an employee of a mining company became excited because breathing was a little difficult and pulled off his mouthpiece; one of the other men of the party struggled with him and got his mouthpiece replaced and removed him to the surface.

ACCIDENTS IN WHICH LIVES WERE SAVED.

Summarized accounts of accidents at which lives were saved are given below.

JULY 10, 1917, EXPLOSION AT THE ROCK SALT CORPORATION SHAFT, ITHACA, N. Y.

In a gas explosion at the bottom of the shaft at 12.30 a. m. one of the two men in the mine lost his life. Thirteen men had been hoisted out of the shaft 10 minutes before the explosion. From the time of the explosion until the rescue party of the Bureau of Mines arrived, at 9.30 p. m., nothing had been done toward recovery, except to try to force fresh air into the shaft. The necessary examinations were made by the Bureau of Mines party which started down the shaft without using apparatus. At the bottom of the shaft one man was found alive, caught by the leg by some timber; he was freed and taken to the surface. The party started to recover the body of the other man, and brought it to the surface about two hours later.

DECEMBER 30, 1917, EXPLOSION IN THE ACME MINE OF THE ACME BY-PRODUCT COAL CO., AT FLEMING, KY.

Four men entered the mine on a Sunday to blast some holes; after the holes were loaded and lighted they started to leave the mine, but when they were about 500 feet from the point of blasting, all the holes went off at about the same time. A rush of wind down the entry caught the men and extinguished their carbide lights. Two men jumped into a room and the other two stayed on the entry. The rush of wind was followed by a gust of flame. The two men that stayed in the entry were badly burned, but were able to make their way out of the mine, where they were found by a rescue party. The rescue party found the other two men, both badly burned, in the room into which they had gone. Their lights had been put out by the explosion and they had become so badly confused that they were unable to find their way out. All four men had entered the mine without the consent of the mine officials.

JANUARY 5, 1918, MINE CAVE IN THE BARNUM MINE OF THE PENNSYLVANIA COAL CO., PITTSTON, PA.

By a cave, covering approximately five acres, at 7:40 a. m. two men were killed and 15 injured. Five of the men were rescued 10 hours after the accident.

JANUARY 28, 1918, SHOT-FIRER'S ACCIDENT IN THE LUTIE MINE OF THE HAILEY-OKLAHOMA COAL CO., LUTIE, OKLA.

Two shot firers, the only men in the mine at the time, lost their lives. The recovery of the bodies was most dangerous and difficult work on account of the heavy pitch of the stope (38°), and 6 to 10 feet of loose slate underfoot caused by the ground caving after the timber had been blown out by the explosion. Rescue apparatus was used in recovering the bodies. Two men not wearing apparatus were overcome by gas. In a short time they were rescued and revived by oxygen apparatus.

FEBRUARY 21, 1918, RUSH OF WATER AND SAND IN THE AMASA-PORTER MINE OF THE NEVADA MINING CO., CRYSTAL FALLS, MICH.

Seventeen men were killed, 3 escaped unassisted, and 1 was rescued after a rush of water and sand broke into the mine through a shaft or bulkhead. The first cage load of men had been unloaded at the 550-foot level and the second cage was being lowered to that level at the bottom of the shaft, when the engineer, noticing an additional loading manifested through the effect on the hoisting engine, immediately tried to hoist the cage, but could not with a full head of steam. Four of the men climbed up the shaft ladders, 3 reaching the surface unassisted and 1 being rescued. Pumps were started in the expectation of getting the water out in a short time and rescuing the men who, it was hoped, had climbed up into a high stope. Meantime the air compressors were kept going to furnish to the imprisoned men air. February 25, at 7.55 p. m., a second rush of water drowned out the pump, raising the water in the shaft above the level of the highest stopes. All hope for rescue was then abandoned.

APRIL 28, 1918, POWDER GAS AFTER BLASTING, IN THE MOUNTAIN KING MINE OF THE MOUNTAIN KING MINING CO., MOUNTAIN KING, CAL.

The men entered the mine in the morning to do some repair work on the 1,200-foot level; as the power was off, they agreed that nobody should go below level. Soon after two miners started to climb down the winze to the 1,400-foot level to see the results of blasting done five hours before by the night shift. Alarmed by the men's not returning in about 30 minutes, the foreman went down to investigate. He returned shortly, reported that the two men had been overcome by powder smoke, and went back with two men to try to rescue the others; all were overcome by gas. Three other men who went down were also caught. The superintendent and rescue party started work but were able to get out only one man who recovered. Several attempts to remove the gas failed. About 7 o'clock in the evening power was turned on, the air compressors started, the gas blown out, and bodies recovered. Had oxygen breathing apparatus been available, probably all of the lives could have been saved.

JUNE 17, 1918, CAVE OF GROUND IN THE SHORT MOUNTAIN COLLIERY OF THE SUSQUEHANNA COLLIERY CO., LYKENS, PA.

Five men were standing timber, when without warning the ground caved, catching all five. One man was able shortly to free himself and went for assistance. Soon a rescue party arrived. In a short time the party got a man out; with medical assistance his life was saved. The next three men were alive when removed but died soon after; the last man was dead when taken from under the fall.

The following table shows the number of accidents investigated during each calendar year since Government investigation of mining accidents began in 1907.

Accidents investigated by Bureau of Mines and number of persons killed and rescued, 1907–1918.

Item.	1907	1908	1909	1910	1911	1912	1913	1914	1915	1916	1917	Jan. 1 to June 30, 1918.
Accidents investigated	12	16	25	25	35	47	73	65	92	62	48	28
Killed	1,106	445	574	722	663	334	634	440	452	259	601	[illegible]
Rescued by Bureau of Mines men	......	2	29	20	13	7	19	2	[a] 43	1	6	7
Rescued by others	21	16	124	243	81	84	106	26	111	66	48	3
Escaped unassisted	5	33	403	132	18	117	100	1,127	2,392	1,544	463	15

[a] Includes 42 miners at Layland, W. Va., rescued jointly by Gary (W. Va.) crew, State inspectors, company officials, volunteer crews, and Bureau of Mines crew.

The accidents investigated during the fiscal year were in 16 States, as follows: Alabama, 1; Indiana, 5; New York, 1; Virginia, 1; Arkansas, 1; Kentucky, 3; Oklahoma, 5; Washington, 1; California, 2; Michigan, 3; Pennsylvania, 6; West Virginia, 1; Illinois 4; Minnesota, 2; New Mexico, 1; Tennessee, 1.

A tabulation of the number of accidents investigated from January 1, 1917, to June 30, 1918, classified by States, is given below:

Number of mine disasters or serious accidents investigated, by States, 1907–1918.

State	1907	1908	1909	1910	1911	1912	1913	1914	1915	1916	1917	Jan. 1 to June 30, 1918.	Total.
Alabama	1	......	1	3	1	2	2	3	2	4	2	....	21
Arizona	......	......	......	......	......	......	1	......	......	......	......	....	1
Arkansas	......	......	......	......	......	......	2	......	......	......	2	1	5
California	......	......	......	......	......	......	1	1	1	7	......	2	12
Colorado	1	......	......	5	4	6	4	2	1	......	1	....	24
Idaho	......	......	......	......	1	2	1	......	......	......	1	....	5
Illinois	2	4	7	2	......	2	1	4	9	6	6	2	45
Indiana	......	......	2	1	1	2	9	7	12	4	5	4	47
Iowa	......	......	......	......	......	......	......	1	......	......	......	....	1
Kansas	......	......	......	......	1	4	4	10	10	5	4	....	38
Kentucky	......	......	1	4	1	3	5	2	1	......	4	....	21
Maryland	......	......	......	......	......	......	......	......	......	1	......	....	1
Michigan	......	......	......	......	2	1	4	4	1	2	3	1	18
Minnesota	......	......	......	......	......	......	1	1	1	......	1	1	5
Missouri	......	......	......	......	1	......	......	2	3	1	......	....	7
Montana	......	......	......	......	1	......	......	1	2	4	2	....	10
Nevada	......	......	......	......	2	......	......	1	......	1	......	....	4
New Jersey	......	......	......	......	......	......	......	......	1	......	2	....	3
New Mexico	1	......	......	......	......	......	1	......	......	......	......	1	3
New York	......	......	......	......	......	......	......	......	1	......	1	....	2
Ohio	......	......	1	1	1	1	4	1	......	1	......	....	10
Oklahoma	......	2	3	4	5	9	5	7	10	2	3	4	54
Oregon	......	......	......	......	......	......	......	......	......	1	......	....	1
Pennsylvania	2	6	6	2	6	10	24	10	25	16	7	5	119
Tennessee	......	......	1	......	1	......	1	2	......	......	1	....	6
Utah	......	......	......	......	......	......	......	1	2	......	......	....	3
Virginia	......	......	......	1	1	1	......	......	1	......	......	1	5
Washington	......	......	1	2	2	......	1	......	2	......	2	....	10
West Virginia	5	3	2	......	4	3	2	5	7	4	......	1	36
Wyoming	......	1	......	......	......	1	......	......	......	3	1	....	6
Total	12	16	25	25	35	47	73	65	92	62	48	28	528

GIBBS BREATHING APPARATUS.

During the year the Bureau of Mines continued tests of the new breathing apparatus designed by W. E. Gibbs, engineer of mine-safety investigations, which differs from the Fleuss and the Draeger apparatus in three distinct features:

(1) Control of the oxygen supplied to the wearer, (2) arrangement of the alkali absorbent used to remove carbon dioxide from the exhaled air, and (3) the prevention of excessive heating from the reaction between the carbon dioxide and the alkali.

The rate of oxygen supply is automatic. The wearer of the apparatus breathes into and from a small breathing bag attached to a cooler that contains an admission valve; the automatic opening of this allows oxygen to enter the bag rapidly from the oxygen tank through a reducing valve of improved design. Thus the rate of oxygen supply is controlled by the wearer's breathing and, as tests have shown, readily adjusts itself to his needs, either at rest, when the consumption is approximately from 300 to 400 cubic centimeters a minute, or during vigorous breathing, when it is between 2,000 and 3,000 cubic centimeters a minute.

This breathing apparatus, a self-contained unit carried wholly on the back of the user, has been brought to form for manufacture during the year and 600 sets have been made. The apparatus is light, its parts are well protected against injury, and recent tests show it to be a distinct advance as regards simplicity, lightness, reliability, capacity, and efficiency of regeneration. Pending extended use of the Gibbs apparatus under practical conditions, in entering mines after explosions and fires, its use has been tentatively approved by the bureau; thus it has been placed officially on the same footing as the Fleuss and the Draeger.

In two mine fires and in one disaster the Gibbs apparatus met all requirements. Fifteen tests were made with it, eight of which were during a period of more than two hours of strenuous work, to determine the functioning and the tightness of the apparatus. The remaining seven tests were for determining efficiency of the regenerative cartridge. All results were satisfactory; only a little carbon dioxide, usually less than 1 per cent, was present in the air supplied the wearer.

Sixty-five sets of Gibbs apparatus have been received by the Bureau of Mines. These, after being tested for tightness and proper functioning, and after their record is taken, are being distributed to the cars and stations. A blue print showing the circulation of air and a sheet explaining the tests that should precede use in noxious gases accompany each apparatus.

COAL-MINING INVESTIGATIONS.

MINE SUBSIDENCE.

The field work on subsidence of the surface from coal-mining operations which was begun in Illinois in 1916 has been continued during the past year in cooperation with the State of Illinois.

The observations made at regular intervals at monuments on the surface and the plotting of the underground surveys showing where coal had been extracted have given valuable information on surface subsidence. During the year W. B. Plank, for the Bureau of Mines, L. E. Young, of the State university, with the assistance of local mining engineers, conducted the field work.

FIELD INVESTIGATIONS.

Investigations of mine hazards have not been prosecuted as vigorously during the past year as during 1917 owing to the lack of engineers for field investigations. However, a number of reports on explosion hazards were completed during the year, and abstracts of these were furnished mine operators as guidance in forestalling dangers within mines. The work has been largely confined to mines in which explosions occurred during the year.

In connection with the investigations of mines in which explosions have occurred, special tests have been conducted at the experimental mine of the bureau with coal, road, and rib dust taken from the mine under consideration.

CONTROLLING MINE EXPLOSIONS.

In furthering the application of rock dust as a means of limiting coal-dust explosions, as demonstrated in tests in the experimental mine, a number of the larger mines in Illinois have installed a rock-crushing plant for preparing rock dust. These mines have also installed dust barriers so as to extinguish the flames of any coal-dust explosion that may originate in any part of the mine.

COAL SAMPLING.

In their investigations of mines the engineers obtain samples of the coal bed at the working face. During the year the engineers of the mining division were called on to sample many mines for the Navy Department. This sampling involved the taking of a number of samples within the mine and at the loading tipple, a study of the methods of mining and preparing the coal, and the preparation of a report on each mine.

The field work connected with the investigations described was done under the direction of J. W. Paul, engineer in charge of coal-mine investigations.

EXPERIMENTAL MINE.

EXPLOSIBILITY OF COAL DUST.

Coal-dust explosions, the factors governing them, and the development of methods for preventing or stopping them have been studied at the experimental mine near Bruceton, Pa. Explosion tests were made with the dusts named: (1) Dusts of a subbituminous coal from Illinois; (2) mixtures of coarse Pittsburgh coal dust to show the effect of small percentages of gas in the ventilating current; (3) mixtures of Pittsburgh coal dust in the butt entries to determine the effect of light as compared with heavy stoppings in the cut-throughs; (4) a series of tests in the rooms was started to determine the effects of the location and of the direction of blown-out shots in the coal face.

In connection with the tests with the Illinois coals, a number of mining men from that State spent several days at the experimental mine and other mines near Pittsburgh to observe methods of preventing and limiting coal-dust explosions.

The work was in charge of W. L. Egy, physicist, under the direction of J. W. Paul, coal-mining engineer, and G. S. Rice, chief mining engineer. Mr. Egy was assisted by H. C. Howarth, coal-mine superintendent, H. P. Greenwald, junior physicist, and at different periods of the year by W. B. Plank, assistant mining engineer, J. J. Bourquin, assistant mining engineer, John Steelger, laboratory aid, and Harry Burdelsky, laboratory aid.

LABORATORY TESTS.

The development of a small laboratory-size gallery for the determining of the explosibility of small quantities of dusts has been practically completed. It is expected that with this apparatus, in which a preformed dust cloud is used, the results obtained with coarse dusts and with dust containing considerable moisture will be comparable with the results of the explosion tests in the experimental mine.

A series of laboratory tests was made to determine the factors governing the explosibility of aluminum dust or powder. The inflammability of this dust as compared with coal dust was determined in the Clement-Frazer apparatus—described in the Annual Report for 1917—and also in other special devices in which the quantity of heat and the temperature could be regulated. This work was done by Mr. Leighton, assistant (physical) chemist, under the direction of Mr. Egy.

SAFETY IN MINING.

A subterranean signal detector has been tested at the experimental mine in the hope that signals may be received on the surface from entombed or trapped miners, if the mine cover is not more than 150 to 200 feet thick. This work was conducted by Mr. Egy, assisted by Mr. Leighton.

A method has been developed for giving a danger warning in mines, particularly metal mines, in which compressed air is used throughout the workings. A stench is injected into the compressed-air line, and within a few minutes the odor is spread through all parts of the mine. Results of this work have been prepared for publication as a technical paper. The work is in charge of W. L. Egy, physicist, and Lieut. S. H. Katz, formerly assistant physical chemist of the Bureau of Mines, assisted by V. C. Allison, junior chemist.

The experimental mine was used for the annual field examination for mine foremen and fire bosses of the Pittsburgh district. Special hazards were placed in the mine and the candidates were required to report on mine conditions.

COAL-MINING PROBLEMS OF THE PACIFIC NORTHWEST.

G. W. Evans, coal-mining engineer of the Seattle station, acted as consulting engineer to the Alaskan Engineering Commission in the development of coal mines in the Matanuska field, and as consulting engineer to persons undertaking the development of coal leases in Alaska. In connection with this work, screening and float-and-sink tests of Matanuska coal were made, as well as coking tests and foundry tests of the coke produced.

The work being done in the State of Washington includes the study of mining practice, of coal-washing methods and the coking of Washington coals. The field investigations for a bulletin on mining methods were practically completed. Investigation of the products and the wastes at the 29 coal washeries in the State were undertaken with a view to increasing their efficiency.

Other work done included an examination of the Oregon coal fields and the Teton Basin coal field of Idaho; a study of the use of powdered coal under boiler, as at Black Diamond, Wash., and cooperation with the Federal fuel administrator for the State of Washington.

COOPERATION WITH OFFICE OF INDIAN AFFAIRS.

As in previous years a representative of the Bureau of Mines has been engaged in cooperative work with the office of the superintendent for the Five Civilized Tribes, at Muskogee, Okla., about 95 per cent of the time. This work involved inspection of leases for coal and asphalt, lead, and zinc, and nonmetallic minerals on allotted Indian land for the superintendent. In such work the representative of the bureau has generally cooperated with the United States oil inspector, O. U. Bradley.

In work on the segregated coal and asphalt lands the bureau's representative has cooperated with the Indian coal land trustees, Wm. R. McIntosh and J. Hamp Willis, for the Choctaw and Chickasaw Nations. As in the past, there has been the heartiest cooperation from these trustees and from the office of the superintendent for the Five Civilized Tribes.

APPRAISAL OF SEGREGATED COAL LANDS.

On March 14, 1918, the representative of the Bureau of Mines at McAlester, Okla., was detailed for duty by the Secretary of the Interior in appraising under the act approved February 8, 1918 (H. R.

195, Public 98, 65th Cong.), the coal and asphalt deposits, both leased and unleased, in the segregated mineral area of the Choctaw-Chickasaw Nations in Oklahoma, and to determine from data on file in the office of the superintendent for the Five Civilized Tribes the extent, character, and value of those deposits with a view to offering the tracts for sale. Mr. Gabe E. Parker, superintendent for the Five Civilized Tribes, Muskogee, Okla., and J. George Wright, superintendent of the Osage Indian agency, Pawhuska, Okla., were detailed as appraisers to act with the representative of the Bureau of Mines, who for five years has been gathering detailed information concerning mining conditions on the segregated Indian coal lands in Oklahoma, in order to publish a regional report. All of this information has been put at the service of the coal-land appraisers and has greatly expedited their work. Maps have been prepared for the appraisers' use showing the location of all mines, old and new, the extent of their workings, and the outcrops of the various coal beds.

METAL-MINE INVESTIGATIONS.

Metal-mine investigations included those made in connection with the rescue and first-aid training done by car 1 in the Pacific coast district, car 2 in the southern Rocky Mountain region, car 5 in the northern Rocky Mountain region, and car 7 in the Lake Superior copper district. Special investigations relating to silicosis and the general health of miners in the Butte, Mont., district were made by Daniel Harrington of the bureau and Dr. Lanza of the Public Health Service. In the Butte district C. A. Allen, mining engineer on car 5, studied mining methods, and in the California district H. M. Wolflin, district engineer and chief inspector of the State of California, investigated mine safety and mining methods. In the Arizona and New Mexico district, C. A. Herbert in charge of car 2, and in the Lake Superior district, late in the year, B. O. Pickard, who has been appointed district engineer, made similar investigations. R. R. Hornor, mining engineer, made examinations to determine the commercial value of mineral deposits in the States of Utah and Washington. Subsequently he investigated the black sands deposits of Oregon and the tin deposits of the Black Hills, S. Dak. He was then transferred to the Appalachian district where he investigated pyrite resources for the War Minerals Committee. The investigations named were in general in charge of the chief mining engineer.

MINE SANITATION AND HYGIENE.

Through a cooperative agreement with the Public Health Service, experienced surgeons were detailed to the new rescue cars Nos. 1, 2, and 5. Surgeons will also be detailed to cars 9, 10, and 11 when ready for service. Since the completing of the special investigations at Butte by Daniel Harrington, mining engineer, and Dr. Lanza, passed assistant surgeon Public Health Service, Dr. Lanza has been transferred to Pittsburgh where he has general supervision over the work of the car surgeons.

During the past year the car surgeons made sanitary investigations at the mines and camps visited by the cars and gave numerous illustrated talks on sanitation and how to prevent the spread of some of the more common diseases. Conditions favoring occupational diseases at various mines, mills, and smelters were also studied. Some of the communities, mines, and plants investigated are named below.

INVESTIGATIONS BY DR. F. F. WORLEY, ON CAR 1.

Dr. F. F. Worley, while attached to car 1 (July, 1917, to May 15, 1918), examined sanitary conditions at 56 metal mines and 9 coal mines; he made reports on 25 mining communities in his reports on mines, and reported on 18 mining towns separately. Dr. Worley also examined 285 men to determine whether they were physically qualified for mine rescue work, gave two lectures on mine sanitation at the University of California, and investigated the health hazards at an electrolytic zinc plant.

Among the sanitary investigations were those at the Potosi mine and camp at Arden, Nev., and the Prince mine and camp at Pioche, Nev. Dr. Worley also made preliminary investigations of lead poisoning in the mining industry of Utah, and while car 1 was in California studied methods of the California State Board of Health in its campaign against hookworm and extended active cooperation. The risks of mercury poisoning in the quicksilver plants at Idria, Cal., were examined.

During the latter part of May and during June Dr. Thometz, attached to car 1, investigated sanitary conditions at five mines and three mining camps and spent considerable time investigating lead poisoning at Utah mines.

INVESTIGATIONS BY DR. R. C. WILLIAMS, ON CAR 2.

Dr. Williams, on car 2, investigated sanitary conditions of 11 coal mines and camps and 22 metal mines and camps. He instructed 8 first-aid classes, in which 208 men were trained, and examined 274 men for their physical fitness for training in mine rescue work. Some of the investigations are named below:

Report of work done by car 2 at the fire at the Government mine of the Carthage Fuel Co., Carthage, N. Mex.; report on the Superior and Boston mine, Copper Hill, Ariz.; sanitary investigation of the town of Kennett, Cal.; sanitary inspection of the new electrolytic zinc plant of the United States Smelting & Refining Co.; and sanitary investigations at the following mines and mining towns: The Balaklava mine and camp, Kennett, Cal.; Shasta King mining camp, Kennett, Cal.; Mammoth mining camp, Kennett, Cal.; Ray Consolidated Copper Co., Ray, Ariz.; Inspiration Consolidated Copper Co., Inspiration, Colo.; Silver Bell mine of the American Smelting & Refining Co., Silver Bell, Ariz.; Superior and Boston mine, Copper Hill, Ariz.

INVESTIGATIONS BY DR. R. C. SAYERS, ON CAR 5.

During the fiscal year Dr. Sayers made sanitary surveys of 16 coal-mining towns and 16 coal mines in Montana and Wyoming, 9 metal-mining towns and 20 metal mines in Montana and Idaho, and 12 lead smelters in California, Colorado, Idaho, Montana, Utah, and Washington, with especial reference to the hazard of lead poisoning. Besides assisting the regular instructors at many classes, Dr. Sayers instructed 11 classes of 252 persons who qualified for first-aid certificates and also instructed a class of more than 200 cadets at the University of Idaho and a class of more than 500 at the State College of Washington. The cadets did not qualify for certificates as they were not connected with the mining industry.

Some of the reports submitted on the investigations made are made below:

Report on the Globe smelter of the American Smelting & Refining Co., at Denver, Colo.; report on Arkansas Valley smelter of the American Smelting & Refining Co. at Leadville, Colo.; report on the Salida smelter of the Ohio & Colorado Smelting & Refining Co. at Salida, Colo.; report on the Salida smelter of the Ohio & Colorado Smelting & Refining Co., at Salida, Colo.; report on the Bunker Hill and Sullivan smelter of the Bunker Hill & Sullivan Mining & Consolidation Co.; report on investigations at Rock Springs, Lyons, and Reliance, Wyo.; report on the Northport smelter of the Northport Smelting & Refining Co., at Northport, Wash.; report on the Selby Smelter of the Selby Smelting & Refining Co. at Selby, Cal.; report on the El Paso smelter of the American Smelting & Refining Co., at El Paso, Tex.

COOPERATIVE SAFETY WORK IN CALIFORNIA.

In California cooperation between the Bureau of Mines and the State Industrial Accident Commission continued on the same basis as in former years, a mining engineer assigned by the bureau acting as chief inspector for the commission. The commission employed three deputy inspectors, a first-aid instructor, and furnished office quarters.

The principal features of the year's work were as follows:

Inspections of 362 mines and mills, gold dredges, quarries, and construction tunnels, this inspection affecting the safety of approximately 12,500 men. In general, safety conditions were found better than at the last inspection, the suggestions and requirements made then having been followed.

Thirty mine, mill, quarry, gold dredge, and construction-tunnel fatalities were carefully investigated. Each of these accidents resulted in the death of one to five men, there having been 46 fatal accidents in these industries in the State during the fiscal year. The engineer who investigated the accident made recommendations to prevent future accidents, and in practically every case these recommendations have been followed.

Fifteen complaints in regard to dangerous conditions were received and carefully investigated.

Sixteen requests for exemptions from various provisions of the mine safety rules were made by mine operators. Each request was investigated and recommendations were made to the Industrial Accident Commission.

As part of the safety campaign among miners and mine operators, one safety bulletin and three "Safety Bear" letters were issued. Two additional bulletins and one "Safety Bear" letter were prepared for publication.

On November 27, 1917, the commission employed Walter F. Pyne as first-aid instructor, who during the remainder of the fiscal year trained 31 classes in first aid. All told, 407 persons took the complete course and 300 more took part of the training.

Films and lantern slides loaned by the Bureau of Mines as well as hookworm exhibits loaned by the State board of health have been used to hold the interest of first-aid classes. Because of many workmen being unable to understand English, Mr. Pyne has arranged with the University of California, extension department, for a course in English to foreigners.

Safety rules for gold dredges, which had been 60 per cent completed by the committee during the previous fiscal year, were approved by the commission, after a public hearing, and sent to press.

Tentative safety rules for quarries, which were 50 per cent completed during the previous fiscal year, were also completed and sent to press.

During the year the deputy mine inspectors made 52 trial merit ratings of the larger California mines for compensation insurance.

COMPLEX AND LOW-GRADE ORES IN WASHINGTON.

R. R. Hornor, mining engineer, examined deposits of low-grade and complex ores in Stevens County, Wash., for the purpose of furnishing the Seattle station of the bureau with representative samples, and of collecting such data as might be necessary in determining whether the treatment of these ores would involve any unusual concentration and metallurgical problems.

The field work was undertaken in cooperation with the State Geological Survey which was collecting data for a geologic map and a mineral resources report covering Stevens County.

The field work was under the direction of Dr. Charles E. Weaver of the State Geological Survey.

BLACK SANDS.

In July, 1917, Mr. Hornor began an investigation of the black sand deposits of southern Oregon and northern California, making a systematic examination of some of the more promising localities in Coos, Curry, and Josephine Counties, Oreg., and Del Norte County, Cal. These sands carry gold and platinum in association with magnetite, chromite, ilmenite, and various siliceous minerals. The deposits examined extend along the coast, and some miles inland, from Marshfield, Oreg., to Crescent City, Cal.

The purpose of the investigation was to determine whether any of the deposits was large enough and contained enough gold and platinum to constitute an important source of supply of these metals, especially platinum; also, whether the magnetite and chromite might be commercially utilized. The deposits proved disappointing. They rarely contain enough gold and platinum or are large enough to be worked at a profit, and no important supply of platinum can be expected from them.

TIN ORES.

Although the United States uses about 60 per cent of the world's annual production of tin, yet it produces practically none and depends on foreign supplies. The Director of the Bureau of Mines having recognized that interest in the production of domestic tin should be stimulated as a war-time measure, decided to have investigated some of the tin-bearing localities in the United States.

One of the districts that has attracted attention in the past extends southwest from Lincolnton, N. C., into South Carolina near Kings Mountain, the tin being in pegmatite dikes and intrusions. Thomas Leggett, an eminent mining engineer of New York, volunteered his services, and accompanied by George S. Rice, chief mining engineer of the bureau, made investigations of certain localities in this district. Sampling was done by B. O. Pickard, of the bureau; also the operation of a concentrating mill was studied by C. Seymour Newcomb, of the Dorr Co., which voluntarily rendered this service. The results were disappointing as regards possible commercial output.

In October, 1917, R. R. Hornor, mining engineer, and Thomas Varley, superintendent of the Seattle station, examined tin deposits in the Black Hills region, with a view to determining their magnitude and commercial possibilities. The results were in general disappointing. Tin-bearing pegmatites occur over a wide area, but the tin content proved to be small.

PYRITE INVESTIGATIONS.

An account of the scarcity of sulphur-bearing materials in this country, which is partly due to the shortage of shipping that prevented Spanish pyrite from being imported, the Bureau of Mines began inquiries into the possibilities of utilizing domestic pyrite and pyrrhotite.

Examination of a pyrrhotite deposit in Maine, north of Bangor, examined by C. E. Julihn, mining engineer, showed a considerable reserve which under certain conditions of transportation and market would be of potential value. Mr. Julihn also examined certain pyrite mines and deposits in northeastern New York, which offered possibilities of further development.

At the request of the War Minerals Committee the producing pyrite mines of the Appalachian and Mid-Western States were investigated in order to obtain exact and recent information regarding the condition of the mines, and their present and probable future production. The field work was assigned to C. E. Julihn and R. R. Hornor, mining engineers, the former covering the pyrite-bearing areas of Georgia and Alabama, and the latter those of the Carolinas, Virginia, and northern New York, Missouri, Colorado, and Wisconsin. This work was underway at the end of the fiscal year.

PHYSICAL TESTS OF EXPLOSIVES.

During the fiscal year the physical tests of explosives were made under the supervision of the chief mining engineer, because industrial explosives are chiefly used in mining. Samples gathered from time to time by mining engineers in the field are sent to Pittsburgh where they are tested. Thus the work of the explosives engineers connects with that of the mining engineer.

During the year, owing to the exigencies of the war, samples of military explosives were from time to time submitted to the bureau and questions of substitutes for explosives and ingredients in explosives constantly arose. Also the investigations under the explosives regulations act, especially those relating to the prevention of explosion disasters, became increasingly important. Accordingly at the end of the fiscal year in order to correlate the work of the explosives regulation division, work being done for the Army and Navy and the regular work for the mining industry, it was decided to place all explosives work in an explosives division under the charge of Clarence Hall as chief explosives engineer.

The Bureau of Mines determines, by certain prescribed tests, the characteristics of coal-mining explosives. Explosives that pass all these tests are placed on the bureau's list of permissible explosives. Such explosives are considered relatively safe for use in gaseous and dusty coal mines. During the year three new explosives were placed on the permissible list and six others were placed on the list because they were identical with explosives on the list already. On June 30, 1918, the list contained the names of 160 explosives as compared with 151 on June 30, 1918.

A great variety of blasting supplies were investigated in order to ascertain the safest methods of handling explosives.

Explosives problems were undertaken in direct cooperation with the Ordnance Department of the War Department. Many of these investigations were for the purpose of ascertaining the relative sensitiveness of explosives to frictional and direct impact. The pendulum friction device and the large impact machine used are unique and are of exceptional value for such tests.

Many problems arose involving substitutes for the scarcer and more expensive constituents of industrial and war explosives. Because of the growing scarcity, through military requirements, of certain ingredients used in industrial explosives, it was thought wise to undertake the testing, for mine and quarry use, of a long-known but little tried explosive—liquid oxygen in a cartridge with carbonaceous matter fired by ordinary caps or detonators. Results of tests in driving the Simplon tunnel, in Switzerland, had been successful, but the explosive could not be obtained then at a price to compete with dynamite. However, the method was revived in Germany in 1914 soon after the war began, and in 1915, according to a German mining paper, was being used in three mines in Upper Silesia at costs per unit of coal blasted equal to that obtained with dynamite at 12, 13, and 15 cents a pound. American observers in Germany before the United States entered the war reported that liquid oxygen explosive was then being used extensively for general blasting.

To obtain information as to the strength of the liquid oxygen explosive and the best methods of use, a series of tests were made in the bureau's laboratory at Pittsburgh, carrying and soaking apparatus was made, and favorable tests were conducted in a quarry. Results showed that a mixture of liquid oxygen (85 per cent oxygen) with carbonaceous and absorbent material was equivalent in strength to 40 per cent dynamite. The chief difficulty in use is that the liquid oxygen evaporates so rapidly that the cartridge must be used immediately after dipping in the oxygen, hence further investigation is needed to determine the best way in which the explosive can be used practically in mines and quarries.

During the year a new explosives experiment station was constructed near Bruceton, Pa., on a site just west of the experimental mine. Each piece of apparatus was moved separately from the site in Pittsburgh and set up ready for operation. In this way the work of moving did not interfere with the testing of explosives. Many improvements in equipment were made that will greatly facilitate and improve the methods of testing explosives. One of those improvements is the design of the "bombproof," in which large charges of explosives will be fired to determine their rate of detonation. The testing instruments are housed in three instrument shelters, each 30 feet long by 20 feet wide, built of hollow partition tile covered on the outside with cement stucco.

SPECIAL TESTS AND INVESTIGATIONS.

The following is a list of special tests and investigations made during the year:

1. Physical tests of propylene-glycol-dinitrate explosives.
2. Sensitiveness of dyestuffs to detonation and ignition.
3. Determination of the nature of the gaseous products of explosion of gelatin dynamites from California.
4. Pendulum friction tests of explosives for hand-grenade fillers.
5. Sensitiveness to detonation of molten acid trintrotoluene.
6. Poisonous gases evolved by certain military explosives when detonated.
7. Efficiency tests of a waterproof detonator protector.

In determining the character and strength of the different explosives, 1,289 examinations and tests were made during the year.

INVESTIGATIONS OF EXPLOSIONS.

Investigations were made with reference to the cause of the following explosions:

1. Explosion of SF black blasting powder, J. C. Greer & Co., near Export, Pa.
2. British-American Chemical Co., College Point, Long Island, N. Y., October 13, 1918.
3. United States Aluminum Co., New Kensington, Pa., November 5, 1917.
4. Carnegie plant of the Aetna Chemical Co., Heidleberg, Pa., December 5, 1917.
5. Bungalow of Mr. and Mrs. Hugo Beyer, Edgewood Acres, near Pittsburgh, Pa., December 11, 1917.
6. National Chemical Manufacturing Co.'s plant at Hunkers, Pa., April 16, 1918.

7. Burton Richards Co., near New Castle, Pa., May 8, 1918.
8. Aetna Chemical Co., Oakdale, Pa., May 18, 1918.
9. American Works, Gresselli Powder Co., near New Castle, Pa., June 25, 1918.

FEES FOR TESTS.

The total sum on deposit at the beginning of the fiscal year and the sum collected during the year for tests of explosives was $1,073; the sum from the classes of tests were as follows:

For permissibility tests of explosives that passed the tests	$7,750.00
For special experimental tests	54.00
Returned to applicants	9.00
On deposit at end of fiscal year 1918	260.00
	1,073.00

PERSONNEL OF LABORATORY.

The physical tests of explosives were in charge of S. P. Howell, explosives engineer, aided by J. E. Tiffany, assistant explosives engineer, and Charles Schuler, shot firer, throughout the year, and by J. E. Crawshaw, explosives testing engineer, A. J. Strane, assistant explosives engineer, J. L. Sherrick, G. E. Postma, W. J. Montgomery, E. Stein, and H. C. Hopkins, junior explosives engineers, and A. W. Jarvis, shot firer, during various parts of the year.

EXPLOSIVES CHEMICAL LABORATORY.

The explosives chemical laboratory of the Bureau of Mines is at the Pittsburgh station. During the year, the laboratory was moved from the old building at Fortieth and Butler Streets to the new building at 4800 Forbes Street.

The work of the laboratory may be classified as follows:

Chemical examination of samples of explosives submitted to the bureau for tests to determine the permissibility of the explosives for use in dusty or gaseous coal mines, or the suitability of the explosives for other industrial purposes.

Analysis and inspection of explosives for other departments of the Government.

Analysis and testing of miscellaneous explosive substances and related materials.

Investigations of methods for the analysis and testing of explosives and related material.

Investigations of the preparation, properties and uses of explosives.

Work on propylene glycol dinitrate involved the nitration of propylene glycol; the determination of the properties of the dinitrate; and the preparation and analysis of different types of commercial explosives in which this material was substituted for nitroglycerin.

SPECIAL PROBLEMS OF WAR WORK.

War work has brought special problems to the division, such as tests of the Roberts by-product coke oven, in cooperation with the Bureau of Standards; furnishing data on the handling of granulated coal to the Emergency Fleet Corporation; and making studies of combustion, boiler baffling, and heat transmission in connection with the boilers for the emergency fleet.

As a result of the Government fixing prices for coal, the methods of purchasing coal for Government use were completely changed. In consequence work of the fuel inspection section varied greatly in amount.

The necessity of providing added supplies of fuel in sections having large undeveloped supplies of lignite, together with the sudden revival of interest in methods of using lignite more efficiently, made investigations of lignite desirable and work was begun on them.

MECHANICAL EQUIPMENT OF MINES.

Studies of mine equipment have been conducted, although most of the personnel has been engaged on problems strictly relating to the war.

NEW BUILDINGS AT THE PITTSBURGH STATION.

After many delays on the part of the contractor, the main wing of the new building at 4800 Forbes Street, Pittsburgh, Pa., was available in the early fall of 1917, and was occupied by administrative offices and members of the mining division. Later, the chemical laboratories were occupied one by one, the fuels work remaining at the old plant during the winter of 1917–18, because a power service building at the new site was not available. Current was obtained from the city lines and, through the courtesy of the Carnegie Institute of Technology, heat was obtained from its plant near-by. Complete installation of the new power plant will probably not be realized until the late fall of 1918. Plans were made to loan for war work to the Ordnance Department of the Army 10,000 square feet of laboratory space in the new building.

STUDY OF ILLINOIS COALS.

At the Urbana station the greater part of the year was given to the investigation of problems related to war activities.

A report entitled, "Carbonization of Illinois Coals in Inclined Gas Retorts," was published as Bulletin 20 of the State Geological Survey of Illinois. The purpose of the work described, which was done under a cooperative agreement, was to increase the use of Illinois coals for manufacturing gas. Tests in a gas plant were made with mixtures of low-sulphur Illinois coals and Kentucky gas coal. The results showed the improvement in coke and the advantage in uniform operating conditions derived from mixing the coals before charging.

A study of the methods and apparatus for recovering light oil, including benzol and toluol, from carbureted water gas with the intention of adapting present apparatus used in large scale operations to the recovery of this material at small coal-gas and water-gas plants was discontinued before completion.

An inspection was made of the Bussey apparatus for treating coal and bituminous shale for production of gas, toluol, oil, coke, etc. The apparatus was a small experimental outfit that required further development.

The proportion of ammonia in producer gas from high-temperature producers, such as the Smith, was determined. The object was to ascertain whether the amount of ammonia was enough to warrant installation of by-product apparatus to recover it commercially. It was found that 25 to 30 pounds of ammonium sulphate could be recovered from each ton of coal, but the expense of apparatus for recovery is large because of the volume of gas per pound of coal and the low concentration of ammonia in the gas. With the present system of cooling, the ammonia is partly absorbed in different stages and partly consumed in burning the gas; hence the system would need to be changed completely to permit recovery of the ammonia.

In cooperation with the Bureau of Standards the Roberts by-product coke oven was tested to determine its commercial worth and its military possibilities. Coals from the Middle West were used for the test, and the coke therefrom was used in a blast furnace.

INSPECTION OF GOVERNMENT FUEL PURCHASES.

Coal for the Panama Canal and the Panama Railroad Co. was inspected and sampled during the year, and cooperative work with the Navy Department in inspecting and sampling mines in Virginia and West Virginia was carried on.

The coal fields of Arkansas and Oklahoma were inspected and sampled at the request of the United States Fuel Administration—both mine and tipple samples being taken.

The fuel inspection laboratory received and reported on 2,787 samples of coal from the Panama Canal, Panama Railroad Co., and various Government departments, the United States Fuel Administration, and State fuel administrators; in addition, six samples of boiler water were received from the War Department, making a total of 2,793 samples. Analyses of these involved 40,957 determinations.

The chemical laboratory during the year was in charge of H. M. Cooper, Gustave Bornscheuer, W. A. Richards (resigned), Frederick C. Hall, C. B. Hamilton (resigned), W. A. Gonzales, Harvey R. Dunbar, F. J. Hofmann, C. P. Blodgett (resigned), P. M. Nash (resigned), G. F. Pfeffer, junior chemists, and L. Guth, laboratory aid (resigned).

During the year the purchase on the specification basis of coal for the Government was suspended because the United States Fuel Administration fixed the price of all coals. However, the usual analyses were made for various departments as checks on the quality of fuel delivered.

The Interior Department, not being able to procure from local dealers bids for the coal it needed in Washington at prices anywhere within reason, withdrew all proposals and entered the open market to purchase fuel for the fiscal year 1918. An agreement was made with a local dealer whereby the Department obtained the use of a yard, trestle, and tracks; through these it handled about 12,000 tons of coal at a time when the general demand for coal was heavy, and at no time during the winter was there any shortage of coal at the various branches of the department. The coal was purchased in the open market through the United States Fuel Administration, and delivered from the cars direct to the institutions in two 5-ton motor trucks, purchased for the purpose, at a saving of $8,800 over the cost of coal had it been purchased through the local dealers.

The fuel inspection section was under the direction of G. S. Pope, engineer in charge, assisted by P. M. Anderson, P. M. Riefkin (resigned), N. H. Snyder, and H. W. Jarrett, engineers.

GOVERNMENT COAL YARD.

The establishment of a Government coal yard in the District of Columbia and the purchase of all coal for Government buildings in the District through an organization having charge of this yard has been advocated by the Bureau of Mines as a measure that would increase efficiency in the use of fuel by the Government. The unusual conditions of the winter of 1917-18 brought out very clearly some of the advantages that would accrue from centralizing the purchase, storage, and distribution of the coal needed by the various departments and bureaus. In consequence Congress, after a thorough review of the situation, authorized an appropriation of $432,300 for the establishment of a coal yard or yards having a large storage capacity, with the necessary equipment of motor trucks for hauling the coal from the yard to the various buildings, and also appropriated $1,154,088 for maintenance.

ELECTRICAL EQUIPMENT OF MINES.

First in importance of the work done by the electrical section of the Pittsburgh experiment station during the year was that relating to investigations bearing on war problems. In the early part of the year, H. H. Clark, electrical engineer, in charge of the section, was detailed to Washington. He took with him four junior electrical engineers, leaving two men to continue the work at Pittsburgh. Thus, five-sevenths of the technically trained force of the section has given attention entirely to problems relating to the war.

During the year the section moved to the quarters in the new building of the Pittsburgh station. Much time was spent in designing and supervising the construction of new apparatus and in installing it at this plant, but such work did not appreciably interfere with routine tests.

ROUTINE TESTS OF APPARATUS.

Tests leading to approval of permissible apparatus have been performed as follows:

SCHEDULE 2A (EXPLOSION-PROOF MOTORS).

Approvals have been extended to cover four additional coal-cutting mining machines and work is in progress on three other equipments.

SCHEDULE 6A (ELECTRIC MINE LAMPS).

Approvals under this schedule have been extended and further work is in progress.

SCHEDULE 8 (GAS DETECTOR).

As a result of preliminary tests of the Burrell gas detector, recommendations were made that the detector be modified and further developed before official test for approval.

SCHEDULE 11 (ELECTRIC FLASH LAMPS).

The first approval for an electric flash lamp was granted to the American Ever Ready Works of the National Carbon Co. This lamp is approved for use in explosive atmospheres of methane and air and should be an aid in mine rescue and recovery work.

PERSONNEL OF THE SECTION.

The following men were detailed to Washington the first of the year: H. H. Clark, electrical engineer; R. W. Crocker, O. I. Gaines, O. C. Heffner, and S. P. Stone, junior electrical engineers; the following men have carried on the work at Pittsburgh: L. C. Ilsley, assistant electrical engineer, E. J. Gleim, junior electrical engineer, and C. M. Means, consulting electrical engineer. The following junior electrical engineers worked one to four months: P. J. Simmons, resigned, E. L. Wiegand, resigned, J. C. McQuillan, resigned, and W. G. Thomas. G. E. Highriter, junior electrical engineer, reported for work June 24.

DIVISION OF MINERAL TECHNOLOGY.

The division of mineral technology is conducting investigations relating to the production and utilization of various metals, minerals, and mineral products, including the minor metals, rare metals, various alloys, nitrogen, building materials, clays and clay products.

The work of the division during the year dealt largely with problems relating to the war, especially the production of nitrates needed for explosives and for fertilizers, and the preparation of special alloys for use in the manufacture of steel for cannon.

This division is under the supervision of Charles L. Parsons, chief mineral technologist.

The study of the oxidation of ammonia to nitric acid was continued and a process brought to a high degree of perfection. J. D. Davis and Capt. George A. Perley, the latter delegated from the Ordnance Department of the Army, continued their cooperative work with the Semet Solvay Co. at Syracuse, N. Y., in connection with various experimental units and with the experimental plant built and operated there. The work done has determined that nitric acid can be efficiently manufactured from coke-oven ammonia; that coke-oven ammonia properly purified contains no substance that acts as a poison on the catalytic agent, and that with comparative ease a yield of 93 to 94 per cent of nitric acid can be obtained from the ammonia oxidized.

Several designs of apparatus were tried out and a new design developed and patented. The details of this, however, can not be made known until after the war. An important plant is being equipped with this improved apparatus which requires no electrical heating and is believed to be the cheapest to construct and the most efficient to operate yet devised.

Experimental work on a large laboratory scale was carried out at the Washington office by Messrs. G. B. Taylor and J. H. Capps. Various gauzes were tried out comprising platinum, various alloys of platinum, more particularly platinum-palladium, and gauzes of pure palladium. The palladium gauze gave results similar to those of platinum, but it disintegrated and hence was useless. Pure platinum gauze, 80-mesh screen, was found to give best results. Various forms of activated platinum gauze were also studied and the effect of various poisons on platinum were determined. The only serious poison found that was apt to occur in ammonia was phosphine. Hydrogen sulphide and cyanogen of low concentration are not toxic. Apparently cyanogen can be oxidized as well as ammonia itself.

A considerable part of the time of the chief chemist of the Bureau of Mines was given to the planning and construction of Chemical Plant No. 4 at Saltville, Va., for the War Department. At the request of the Secretary of War, the Secretary of the Interior undertook the construction and operation of this plant, the details of carrying this into effect being intrusted to the chief chemist of the bureau. An engineering organization of some 20 men was assembled in January, 1918, and early in March construction began. The sum of $2,800,000 was set aside by the Ordnance Department for the development of this plant which will probably begin manufacturing early in October, 1918.

INVESTIGATION OF RARE METALS.

At the Golden, Colo., mining experiment station, investigations of radioactive and rare metals continued throughout the fiscal year. These elements and metals included uranium, radium, thorium, mesothorium, tungsten, molybdenum and nickel.

SOLUBILITY OF RADIUM SULPHATE.

The solubility of pure radium sulphate was determined as 2.1 mg. per liter at 25° C. in both water and in sulphuric acid up to 50 per cent of acid. Hence radium sulphate is one of the most insoluble salts known. However, the industrial recovery of radium as sulphate does not depend on its solubility alone but on its passing out of solution, when precipitated with barium, to a much greater degree than its solubility would indicate. Experiments are being made to show how much barium should be added to a poor radium ore in order to insure a maximum recovery of radium.

RECOVERY OF MESOTHORIUM IN THE MANUFACTURE OF THORIUM NITRATE FROM MONAZITE SANDS.

Although the carnotite deposits of Colorado and Utah constitute the largest source of radium-bearing ore in the world, the major part of this ore will be exhausted, at the present rate of production, in five or six years. As most of the radium now being manufactured is disseminated and eventually lost because of being used in luminous paint, the production of an element that will partly, at least, replace radium is desirable. Mesothorium, though its emanation life is not nearly so long as that of radium, is a satisfactory substitute in luminous paint and in some therapeutic uses. In cooperation with the Welsbach Co., the Golden station has been investigating the best ways of recovering the mesothorium, hitherto wasted, in the manufacture of thorium nitrate from monazite sands. The results have been satisfactory and will be applied at the plant of the Welsbach Co.

EFFECT OF RADIUM EMANATION ON THE REACTION OF HYDROGEN AND OXYGEN.

Investigations of the laws governing the combination of hydrogen and oxygen under the alpha rays when these gases are mixed with radium emanation is to be extended to other gases. It is believed the results will throw some light on the chemical reactions that take place during electrical discharge and may be of considerable industrial importance.

TREATMENT OF PITCHBLENDE FOR THE RECOVERY OF RADIUM AND URANIUM.

Methods have been devised for recovering uranium and radium from pitchblende ores in Colorado or the concentrates, containing much pyrite, of such ores.

RADIUM LUMINOUS PAINT.

As luminous paint is needed on all the instruments carried on airplanes and is used to a considerable extent on gun sights, experiments are in progress to determine the best methods of producing phosphorescent zinc sulphide, which is mixed with radium salts in making luminous paint, and to determine the factors that govern the luminosity of the paint.

An investigation is being made to ascertain how actinium and ionium—elements found in all radium-bearing ores and having sufficient activity to serve as substitutes for radium in luminous paint—can be recovered from radium-bearing ores during the manufacture of thorium salts for incandescent mantles. Work has been started on the recovery of polonium, which also can be substituted for radium in luminous paint, from lead ores.

TUNGSTEN AND MOLYBDENUM.

The conditions under which tungstic acid, obtained from the chemical treatment of tungsten ores, may be efficiently reduced to metallic tungsten which is used in making tungsten steel, have been studied and the results are to be published.

Work has been done on the recovery of molybdenum, used in special steels, from wulfenite (lead molybdate) and on the separation of wulfenite from vanadinite.

CARON PROCESS FOR MANGANIFEROUS SILVER ORES.

Under a cooperative agreement with the Netherlands East Indies Bureau of Mines and the Research Corporation, the Caron process for recovering silver from oxidized ores, especially those that contain manganese and hence can not be treated directly by hydrometallurgical methods, is being developed at the Golden station.

The Netherlands Government is interested in the process by reason of the large deposits of such ore on Government-owned lands in Sumatra, and Mr. Caron has assigned his original patent to the Research Corporation, which is acting as an administrative agency in handling the patent.

In this process the ore is heated to approximately 800° or 900° C. and brought in contact with a reducing gas, such as producer gas, whereby the manganese dioxide is reduced to monoxide and the silver is converted into such form as to be readily recovered by cyanidation. To prevent reoxidation of the reduced ore a specially modified direct-draft furnace has been developed in which lots of 500 to 1,000 pounds have been treated satisfactorily, so that the process can now be applied not only to the original ore but to similar ores from other localities.

The manganous oxide resulting from reduction is readily soluble in acids, indicating the possibility of recovering the manganese as a by-product.

INVESTIGATION OF MANGANESE INDUSTRY.

W. C. Phalen, mineral technologist, during the field season of 1917, investigated the manganese industry in the United States. The wisdom of this early start in beginning work on this important war mineral has been amply justified in view of its great expansion and the importance that manganese has assumed. The purpose of the work as begun in the division of mineral technology was twofold, as follows: (1) To obtain the results of current value, and (2) to procure data for a bulletin on the industry. The first object was attained in part by brief current reports, as a result of which the bureau was enabled to render early help in the railroad situation at Philipsburg, Mont., where shipment of needed war material was being delayed through inadequate service; to furnish a definite statement with regard to Bromide, Okla., as a site for an armor-plate plant; and to obtain comprehensive knowledge of all the important manganese deposits then known in the United States. Up to the beginning of the field season of 1918, these were the only original data relating to the deposits in possession of the bureau. In view of the rapid expansion of the manganese industry, and because of the present importance of routine war work, the second object, namely, the preparation of a bulletin on manganese, has been temporarily suspended.

On Mr. Phalen's return from the field he was transferred to war minerals investigations, and since then has made two short field trips: (1) in March to the Crimora, Va., manganese deposits; and (2) in June, to certain brown iron ore deposits near Greenville, Tenn.

SALT MANUFACTURE IN THE UNITED STATES.

During the year, Bulletin 146, on the technology of salt making in the United States, prepared by Mr. Phalen, was printed and distributed.

ELECTRIC FURNACES FOR MELTING BRASS.

During the fiscal year work was continued at Ithaca, N. Y., on electric brass melting. A rocking furnace of about 1,300 pounds capacity, built after the bureau's design by the Detroit Edison Co. under a cooperative agreement, was thoroughly tested by the bureau at the plant of the Michigan Smelting & Refining Co., Detroit. The metallurgical results were good, the metal losses of a wide range of alloys being markedly below those obtained by melting the same charges in coke-fired crucibles. The power consumption was low, comparing favorably with that of other electric brass furnaces of equal flexibility. If the metal savings be considered, the over-all cost of melting brass and bronze in the rocking furnace at the Michigan plant was not more than a third of the over-all cost shown by the coke fires under present crucible, fuel, and metal prices, and the furnace can seemingly compete under pre-war conditions.

While the furnace is, of course, most efficient in continuous operation, it is particularly adapted for use at foundries that are idle at night and melt many different alloys, as it is without many of the drawbacks other types of electric furnaces show in such service.

At first some difficulty was found in melting alloys high in zinc, those in which much metallic zinc is added, because zinc condensed about the electrodes causing them to stick and break, but by suitable changes in design and operation this trouble seems to be overcome. However, the rocking furnace has not had an extended test under rolling-mill conditions, where large amounts of zinc are normally charged, but probably the furnace will work satisfactorily there.

After the bureau's tests were completed, the Michigan Smelting & Refining Co. put the experimental furnace into commercial use and construction of four 1-ton furnaces for that firm was begun at once. Two other Detroit firms are each having four 1-ton furnaces built. These twelve furnaces will soon be running, and the results obtained should give fairly definite data on the possibilities and limitations of this new type of furnace.

The results of the tests have been published as Bulletin 171 of the Bureau of Mines and a short digest of the tests has appeared in several technical journals. One firm is considering the use of a furnace of this type for calcining grains of artificial corundum.

The collection of data on the performance of other commercial electric brass furnaces has been continued, and a comprehensive report covering all types will be made as soon as data becomes available on two or three promising furnaces now being developed by various firms.

PREPARATION OF ALLOY STEELS.

In a previous investigation the bureau prepared a considerable amount of ferro-uranium, low enough in carbon and silicon and high enough in uranium for making steels of fairly high uranium content. At the request and with the cooperation of the Ordnance Department, the bureau is attempting to prepare a series of uranium steels, besides tungsten and molybdenum steels, to the specifications of the Watertown Arsenal for test there as to suitability for gun liners. The bureau built and tested a Heroult direct-arc electric furnace for melting these, but found that with the small charge, about 50 pounds, required, the carbon content was exceedingly difficult to control. An attempt was then made to produce some of these steels in cooperation with the Michigan Steel Castings Co., of Detroit, Mich., and a few samples were delivered to the arsenal, but again it was found difficult to meet the chemical specifications, and steels of high alloy content could not be made without using far larger charges than were needed.

The bureau then constructed an indirect-arc furnace in which the chemical composition could be controlled much more closely, and at the end of the fiscal year the whole of the tungsten series and about half of the uranium series had been prepared.

ELECTRIC SMELTING OF MANGANESE ORES.

Another problem assigned to the Ithaca, N. Y., office, because of the good facilities provided under the cooperative agreement with Cornell University for use of the Cornell electric-furnace laboratory, is the electric smelting of low-grade domestic manganese ores. This is a part of the comprehensive work on manganese under the direction of the Minneapolis station. The ores thus far tested have been not only lower in manganese than are acceptable to blast furnaces and electric furnaces, but are also higher in silica; some are higher in phosphorus.

Tests are being made on the relative efficiency of various reducing agents, on the use of various fluxes to give slags of varying degrees of acidity or basicity, and on the elimination of phosphorus. The tests are not complete, but it seems that although the use of low-grade ores in competition with a full supply of high-grade ores will seldom be economical in normal times, yet it is quite possible to produce a usable grade of ferromanganese or silicomanganese, with fair recoveries of manganese, from low-grade ores hitherto practically unused. It appears that the electric furnace can handle ores of such low grades with far less difficulty than can the blast furnace.

QUARRY TECHNOLOGY.

As only a few branches of the quarry industry are of military importance, the quarry technologist spent only about four months of the year on stone-quarry problems, the rest of the year being given to problems connected with the assignment of drafted chemists to chemical service in the Army and Navy, and to technical duties relating to investigations of war materials.

Field work for a bulletin on rock quarrying for cement manufacture was completed and the bulletin is in press. It discusses the most economical and efficient quarry methods, treats of labor-saving devices, and safety problems, and gives quarry cost data.

On account of the shortage of labor and the probability of the labor situation becoming more acute, preparation of a short paper on labor saving in limestone quarrying was begun. The quarrying of limestone for blast-furnace flux is an industry essential to the successful prosecution of the war, and the publication is being prepared with particular reference to this phase of the limestone quarry industry. It points out means of conserving labor either by simplification of method or by the utilization of labor-saving machinery.

These investigations have been in charge of Oliver Bowles, quarry technologist.

METALLURGICAL DIVISION.

DEVELOPMENT OF INVESTIGATIONS.

When it began its work for safety and efficiency in the mineral industries, the Bureau of Mines was not in a position to give much attention to metallurgy. As has been stated in previous reports, the metallurgical work of the bureau started with the investigations made in connection with attempts to solve the problems bearing on the prevention of damage by the fumes and gases from smelting plants treating nonferrous ores. These problems were attacked first in California. The cooperative investigations undertaken with the Selby Smelter Commission were a part of this work, as were also those made with the Anaconda Commission. Later, as funds became available, other metallurgical work was undertaken, the principal object of which was, as prescribed by the organic act establishing the bureau, the prevention of waste.

The work of the metallurgical division is being conducted by F. L. Cottrell, chief metallurgist, with headquarters at Washington, D. C., and by 16 metallurgists whose work for the most part is in connection with the mining experiment stations at Minneapolis, Minn.; Golden, Colo.; Salt Lake City, Utah; Tucson, Ariz.; Berkeley, Cal.; Seattle, Wash.; and Fairbanks, Alaska.

IRON AND STEEL.

As the iron industry covers a wide field and has of itself devoted so much research to the many problems within that field, no great amount of work has been undertaken by the bureau in regard to those problems. However, the hazards to which workmen are exposed at blast furnaces and steel plants have been studied and the results of the investigations have been published. It is hoped that in the near future Congress will provide funds enough to enable the bureau to investigate iron and steel problems at its Pittsburgh station. Pittsburgh is one of the great iron and steel centers of the world, and whenever the necessary funds are made available, many lines of investigation can follow with results that should be of high benefit to the iron and steel industry.

NONFERROUS METALLURGY.

Outside of the work that the bureau did at San Francisco on smelter fumes, its first work on nonferrous metallurgy was undertaken in Utah. In 1913 the Utah Legislature created a department of metallurgical research in the school of mines of the University of Utah. The authorities of that institution arranged with the Federal Bureau of Mines a cooperative agreement whereby the bureau would have charge of whatever investigative work was carried on by the university for the purpose of devising processes for treating the low-grade ores in which the State abounds. Work began in January, 1914, and has since been carried on continuously. The results achieved have been most encouraging, as many processes have been devised. Some of these have already been applied commercially, while plans for installing others are now under way. Moreover, the bureau proposes to make a careful study of the problems related to low-grade and complex ores throughout the country, in order to determine how processes worked out on a laboratory scale at the

Salt Lake City station may be applied, or be so modified as to meet existing circumstances elsewhere.

METALLURGICAL PROBLEMS AT THE NEW EXPERIMENT STATIONS.

ALASKA STATION, AT FAIRBANKS, ALASKA.

In 1915 Congress authorized the establishment of 10 mining experiment stations to work under the supervision of the Bureau of Mines, not more than three of them to be established in any one year. The three stations established in 1916 are all doing metallurgical work. The first station was established at Fairbanks, Alaska, for the purpose of assisting in every way possible the development of the resources in that Territory, where the mines are remote from industrial centers and the aid of engineers and chemists can not be procured as readily as in the States. Because of the time required to assemble a staff and obtain necessary supplies and equipment, work at the station could not begin until the summer of 1917. The influence of the station is already being felt, and its work should be of great advantage in solving the mining and metallurgical problems of Alaska.

SOUTHWEST STATION, AT TUCSON, ARIZ.

The second of the stations established in 1916 is at Tucson, Ariz., this place being selected because the bureau had adopted the policy of cooperating with State agencies in attacking the problems of any district or State. At Tucson are the State University and the headquarters of the Arizona State Mining Bureau and the bureau desired to cooperate with these two institutions. As Arizona is a great copper-mining State, the first problems attacked by the Tucson station related to the treatment of low-grade copper ores. This work is of especial importance because of the distinct saving effected in our national resources when an ore of lower grade is made available by improved methods of treatment. One of the most important results of the work of the southwest station has been the devising of a process for treating low-grade copper ores with sulphurous acid. One of the large mining companies of Arizona is now erecting a 100-ton plant for testing the process on a semicommercial scale, and other companies have arranged with the bureau for similar installations.

NORTHWEST STATION, AT SEATTLE, WASH.

The third station in 1916 was established at Seattle in order to take up the many mining and metallurgical problems confronting the Pacific Northwest and Alaska. Another reason for selecting Seattle is the existence in the Pacific Northwest of many water-power resources whose ultimate development should result in establishing electrochemical and electrometallurgical industries. Hence, special emphasis is to be given electrometallurgical work at the Seattle station, although relatively little has been done as yet because of the difficulty of obtaining from the manufacturers the equipment and supplies necessary. As soon as the equipment has been installed, research work on electrometallurgical problems can be undertaken that will, it is believed, prove of great assistance to electrochemical and electrometallurgical industries now established throughout the country, and especially to those that may be established in the near future in the Pacific Northwest region.

LAKE SUPERIOR STATION, AT MINNEAPOLIS, MINN.

Of the three stations established in 1917, only one is conducting metallurgical work, namely, the Lake Superior station, at Minneapolis, where the work is in cooperation with the University of Minnesota. In the Lake Superior district are vast deposits of iron ore and the problem of utilizing those of low grade is becoming increasingly important. The original plans for the work of the station were that experiments should be made to determine how the iron content of the low-grade ores could be raised so as to permit the ores being profitably smelted in an ordinary blast furnace. However, this work has not yet been actively started at the Lake Superior station because of the greater need of studying manganese problems.

After the outbreak of the war between the United States and Germany this country had to utilize to the fullest extent the shipping available for carrying troops and supplies to Europe. This meant the cutting of imports to the minimum; so the steel makers had to use as far as possible domestic ores in place of imported ores for making the manganese alloys they needed. Inasmuch as the ores in this country are mostly of a lower grade than those formerly imported, it became necessary to determine to what extent these domestic ores could be substituted for the foreign ores. Hence the Lake Superior station at once began investigations relating to manganese. In cooperation with the United States Geological Survey and the War Minerals Division of the bureau, all the manganese deposits of the United States were studied in order to determine how large a tonnage they could furnish.

At the Lake Superior station especial attention was given to the concentration of manganese ores, and to the study of metallurgical practice in order to determine to what extent the lower grade manganese alloys can be substituted in steel making without detriment to the grade of the steel produced.

METALLURGY OF THE ORES OF MERCURY.

Under a cooperative agreement with the New Idria Quicksilver Mining Co. and Mr. Murray Innes, owner of the New Idria mine, various problems relating to the metallurgy of quicksilver were investigated at the Bureau of Mines station at Berkeley, Cal.

A quick and accurate method was devised for assaying quicksilver ores even those high in sulphur or containing appreciable amounts of bituminous matter, for which no good method of analysis was known.

The first field problem attacked was the determination of the efficiency of the commonly used method for condensing quicksilver from furnace gases. Because of the low grade of the ore treated, the mercury content, by volume of the gases leaving a furnace is only a fraction of 1 per cent. From the difficulty in recovering metal from a gas so dilute, some operators had suspected large losses of quicksilver. Investigation showed that under normal conditions the losses of metal in fumes was very small. The results of the tests, which are believed to be the first direct determinations of fume losses at quicksilver works, are in course of publication as a technical paper. As a result of this investigation an improved type of condenser for quicksilver plants was designed and is now being tested on a small scale.

Other problems of the metallurgy of quicksilver were examined as follows: Improvement of methods of sampling quicksilver ores; concentration of low-grade quicksilver ores by wet methods, a work undertaken in cooperation with the northwest station at Seattle; laboratory tests to determine the proper temperatures and duration of roasting for completely removing quicksilver from different types and sizes of ore; and the conditions affecting the health of workers in quicksilver plants.

BROMINE AND POTASH IN CALIFORNIA BITTERNS.

In cooperation with the research committee of the State council of defense, the bureau's station at Berkeley, Cal., examined the bitterns in storage at one of the large plants about San Francisco Bay where salt is made from sea water. The examination showed the bittern contained at least 200 metric tons of bromine. The recovery of magnesia and potash salts from the bittern was investigated.

A new process for the recovery of potash from the alkali lakes of California was investigated and arrangements were facilitated for large scale treatment at Searles Lake.

MISCELLANEOUS WORK OF THE STATION AT BERKELEY, CAL.

Miscellaneous work at the bureau's station at Berkeley included a preliminary investigation of the production of iron from Pacific coast ores; processes for the benefiacation of low-grade ores of metals especially needed during the war, including a process for concentrating manganese; investigation of reported discoveries of war minerals; rendering assistance to miners and prospectors in identifying minerals and supplying information regarding them; devising a quick method for determining the presence of a certain adulterant in Portland cement; and tests made in cooperation with the Department of Justice and the General Land Office to determine whether certain clays on public lands in California should be classed as fuller's earth.

L. H. Duschak, chemical engineer, was superintendent of the station at Berkeley. He had the assistance of G. N. Libby, assistant metallurgist; G. A. Linhart, junior physical chemist; C. M. Bouton, junior analytical chemist, and Esther Kittredge, junior chemist.

RECOVERY OF OXIDIZED COPPER IN OXIDIZED-SULPHIDE ORES.

The most important problem in milling the low-grade "porphyry" copper ores of the Southwest is the recovery of the oxidized copper, that is, the copper present as oxides, carbonates, or silicates, as most of the large ore bodies contain an appreciable proportion of nonsulphide copper. The sulphide minerals in the relatively high-grade sulphide ores are recovered either by flotation alone or by concentration followed by flotation, leaving the nonsulphide copper in the tailings. But many ore bodies contain sulphides and oxidized copper in such proportions that either leaching with sulphuric acid to recover the oxidized copper or mechanical concentration to recover the sulphides is decidedly wasteful, and treatment of such ores offers the same problem as the treatment of the tailings from the relatively rich sulphide ores.

As a first step in the solution of the mixed ore problem a dependable and simple method was developed for determining the exact proportion of sulphide and nonsulphide copper in an ore. This method is described in Technical Paper 198, now in press.

As leaching with sulphur dioxide gas seemed to be a promising method, a 10-ton plant for leaching ores or tailings with hot sulphur-dioxide gas was erected at the Tucson station of the Bureau of Mines.

The apparatus devised for treating the ores comprises a rotating drum in which ore pulp of proper consistence is met by a counter current of heated air carrying 0.5 to 6 per cent of SO_2 gas under slight pressure. All the pulp minerals soluble in SO_2 are discharged in the forms of sulphates in a practically neutral solution. The advantages of the apparatus are economical use of sulphur dioxide, rapidity and thoroughness of solution, economy of construction and operation. Oxides, carbonates and silicates of copper are dissolved and any sulphides present are left in good condition for flotation. The process may be used to extract manganese from oxidized ores carrying iron, lime, and silica gangues, but is not applicable to rhodocrosite and rhodonite ores.

Under a cooperative agreement the Miami Copper Co. is erecting a 100-ton test plant to give the process a thorough trial. The plant will be under the immediate supervision of E. S. Leaver, metallurgist, of the Tucson station.

WORK ON METALLURGICAL PROBLEMS AT SALT LAKE CITY.

As in the past, the principal work of the Salt Lake City station has been the devising of methods of treating low-grade ores. Utah has enormous quantities of sulphide and oxidized ores so complex and lean that common methods of treatment by concentration or by direct smelting, can not be applied. Hence, most of the station work has been done with the idea of developing special processes for recovering the valuable constituents of these ores.

A. E. Wells has been superintendent of the station. During the absence of Mr. Wells in Washington on war work, A. G. Moses, hydrometallurgist, has been acting superintendent.

The work of the bureau at Salt Lake City can be placed under five general heads: (1) Investigation of complex lead ores; (2) treatment of low-grade, complex, oxidized zinc ores; (3) minor problems in treating sulphide ores; (4) war problems; (5) cooperative work with different mining companies.

VOLATILIZATION OF LEAD AND SILVER FROM COMPLEX SULPHIDE ORES.

The investigation of the complex lead ores is separable into two problems: (1) The treatment of complex oxidized ores of lead; and (2) the treatment of complex sulphide ores containing paying quantities of lead, but not amenable to concentration or direct smelting.

The first problem, that of oxidized lead ores, has been investigated for a year or more, and as indicated in past reports, successful results have been obtained. Two methods have been developed, (1) leaching with saturated brine, and (2) chloride volatilization. Hence, this problem can be considered finished, and most of the work of the station during the past year has been on the treatment of complex sulphides containing lead.

The results obtained in volatilizing the oxide lead ores had been so successful that it was decided to determine the feasibility of applying volatilization to lead ores high in sulphur. The process has been under thorough investigation by both large and small scale tests, for the best part of a year. This investigation and problems closely connected with it have included practically all of the work that has been done on the lead problem at the Salt Lake City station during the past fiscal year.

The results obtained on the volatilization of lead from sulphide ores have more than fulfilled the most sanguine expectations. The work done has shown the possibility of obtaining, with most of the ores, recoveries of 95 to 98 per cent of the lead and 75 to 85 per cent of the silver content; and also that these recoveries could be obtained in small cheap installations yielding a product, lead-silver bullion, that could be handled and sold at minimum expense.

The treatment of the sulphide ores is simple. An ore containing more than 10 per cent sulphur is given a preliminary roast. To the calcine a little more than the amount of salt theoretically required to convert all of the lead to the chloride is added, and the mixture is heated in a revolving cement kiln to a temperature of between 850° to 950° C. The lead and silver are converted to chlorides, and are volatilized in the furnace gases. These gases are cooled and the lead is deposited as white fluffy lead chloride by electrical precipitation.

Sulphur does not interfere unless the sulphur content of the ore is more than about 10 per cent. A higher sulphur content tends to cause the ore to fuse in the furnace. Removal of the sulphur in excess of 10 per cent by roasting before treatment in the kiln prevents this slagging.

The lead can be easily removed, the silver can be recovered without much difficulty, but the iron or zinc in the ore remain practically unaffected. Calcium chloride seems the most effective reagent for chloridizing the lead, and sodium chloride the best for the silver in the ores. A mixture of the two chlorides worked the best, and an oxidizing atmosphere proved vitally necessary to success.

Attempts to volatilize the zinc from sulphide ores have been thus far unsuccessful.

TREATMENT OF PRECIPITATOR PRODUCT.

Evidently much of the success of a volatilization process depends on the ease and the cost of making a salable product from the precipitated metals. The fume as precipitated at the station at Salt Lake City is a nearly pure lead chloride containing a little silver, copper, and zinc.

By mixing with the precipitate about 15 per cent of its weight of a reducing agent, preferably coal dust, and enough lime to react with the chlorine present, and by heating to a temperature of about 1,000° C. in a graphite crucible, lead-silver bullion and a calcium chloride slag were obtained. About 15 per cent of the lead was revolatilized but this would, of course, be recovered again in the electrical precipitator.

CHLORIDIZING PURE MINERALS.

The behavior of some of the metals in the ores was erratic and tests were made to discover the reason. Small amounts of the common ore minerals were ground, mixed with sodium or calcium chloride and heated to the necessary temperature in a small electric tube furnace, and the fumes caught on filter paper between two funnels.

All of the silver, lead, and copper minerals could be volatilized readily, but only one zinc salt, zinc sulphate, could be driven off successfully. This is important, because it means that a sulphating roast is necessary before treating a zinc ore, and it is well known that in practice a sulphating roast of most ores is extremely difficult.

VOLATILIZATION OF OXIDIZED COPPER ORES.

Volatilization of lead ores has proved so successful that its application to oxidized copper ores was thought practicable. Work on such ores has recently started and exceptionally successful results have been obtained.

COOPERATIVE WORK ON VOLATILIZATION.

In order to make tests on a larger scale than is possible in the laboratory, a volatilization plant capable of handling 100 pounds of ore an hour was constructed. The plant consisted of a kiln 5½ feet long and 1 foot in diameter, a dust chamber and a 6-tube electrical precipitator, and a small 4-hearth Wedge furnace for preroasting.

The following companies have during the year taken advantage of this plant to test the application of the process to their ores: Combined Metals Co., Pioche, Nev.; Blaisdell Coscotitlan Syndicate, Pachuca, Mexico; Mineral Products Co., Marysvale, Utah (potash); Utah-Apex Mining Co., Bingham, Utah; Edwards, Moore & Scoville, Ogden, Utah (potash); Western Precipitation Co.; and Hayden Development Co., Clarkdale, Ariz.

Satisfactory results were obtained for all ores except those of the Blaisdell Coscotitlan Syndicate, and the failure there was due to the apparatus rather than to an inherent fault of the process.

The bureau is to cooperate with another company in building a still larger plant for further testing of the process.

PRECIPITATION OF ZINC FROM HYDROMETALLURGICAL SOLUTIONS.

One of the primary problems delegated to the station at Salt Lake City was the discovery and perfection of methods of treating complex and oxidized ores of zinc. Hydrometallurgical schemes offer the greatest hopes for success, and the critical problem is not getting the zinc into solution but recovering the zinc from the solutions after leaching—that is, on precipitation.

Different schemes were suggested and tried, but were abandoned for various chemical or economical reasons. To insure entire success two conditions must be fulfilled: First, the method must be simple; second, it must require cheap and easily obtainable reagents. A process under investigation has fulfilled these two conditions. A solution of zinc sulphate, as it would be removed from the ore, has been used because such a solution is the easiest to produce in practice, and because it probably offers the least difficulty in successful precipitation.

Enough limestone is added to the zinc sulphate solution to precipitate all of the sulphate as calcium sulphate. After the limestone an excess of sulphur dioxide is added; this reacts with the zinc sulphate to form soluble-acid zinc sulphite and sulphuric acid, the latter being precipitated as calcium sulphate by the limestone. The calcium sulphate is removed by filtration, and the clear filtrate is heated to remove the excess SO_2 and at the same time form the insoluble normal zinc sulphite. This zinc sulphite is then filtered from the treated solution.

It has been found possible to recover 85 per cent or more of the zinc from the solutions in a zinc product carrying 38 to 43 per cent zinc and less than 2 per cent harmful impurities. On calcination at a low temperature the zinc sulphite breaks up to form SO_2 and nearly pure zinc oxide.

The work on the problem now consists of determining the various factors that affect operation and also any other data that would be of value in the commercial application of the process or make possible an easier estimation of its cost.

As air rapidly oxidized the zinc sulphite to sulphate and hence interfered with precipitation, a laboratory apparatus was developed in which all of the operations necessary could be performed out of contact with the air and in an SO_2 atmosphere.

MINOR PROBLEMS INVESTIGATED AT SALT LAKE CITY.

Among several minor problems investigated at the station at Salt Lake City was the recovery of zinc from by-products of the indigo dyeing industry. It was found that this waste material could be leached with sodium hydroxide and zinc dust obtained from the solution by electrolysis. A technical paper describing the method is in course of publication.

Another problem investigated was the manufacture of phosphoric acid from western smelter acid and western phosphates. The idea was to make phosphoric acid from these raw materials, and to ship this acid to coke-making plants, where it can be made into ammonium phosphate for fertilizer. Results have indicated that although the scheme is feasible chemically, the mechanical difficulties involved are so great that the process was not practicable at present. A technical paper on the investigation is to be prepared.

The feasibility of recovering potash from various natural potash silicates now being wasted was investigated. Fair results were obtained, but none satisfactory enough to indicate that commercial schemes could be evolved. A technical paper on this work is being prepared for publication..

Dr. Bonner, of the University of Utah, is investigating the recovery of oil from the oil shales of Utah and Colorado.

The results so far obtained indicate that although crude oil can be obtained from the shales in varying and seemingly paying quantities, no commercial installations should be attempted without the assistance of the best technical and engineering advice and large financial backing. Work is still in progress.

WAR PROBLEMS.

Two war problems have been investigated at the station at Salt Lake City. The first of these was the production of arsenious chloride direct from species. No satisfactory results were obtained. The more important problem just started is intended to assist American graphite producers in improving their milling and refining methods. Encouraging results have been obtained.

COOPERATIVE WORK IN IDAHO.

Cooperative work between the Bureau of Mines and the University of Idaho having been made possible by the efforts of the university authorities and the generosity of certain mining companies in the Coeur d'Alene region, it was decided to gather all data possible on both the active and the abandoned mining districts in the State, with special reference to the metallurgical treatment of the ores and the devising of methods for effecting a greater commercial saving.

FIELD WORK.

Field work began May, 1917, and continued during the summer. E. K. Soper, now dean of the mining department, Oregon Agricultural College, Corvallis, Oreg.; D. C. Livingston, professor of geology at the University of Idaho, Moscow, Idaho; Thomas Varley, superintendent of the Seattle mining experiment station, and C. A. Wright, metallurgical engineer of the bureau, participated in the work. Mr. Wright visited nearly all of the mining districts in the Coeur d'Alene region and gave most of his time to a study of milling operations.

A report embodying the results of these investigations is now in course of publication as a bulletin of the Bureau of Mines.

EXPERIMENTAL WORK.

The experimental work conducted at Moscow in the well-equipped ore-dressing laboratories of the school of mines, University of Idaho, has consisted chiefly in the treatment of lead and zinc ores by differential flotation, although some table tests were made. The ores treated have come from mills in the Coeur d'Alene region.

Prior to flotation tests, each ore is studied under the microscope to determine the relationship of the minerals.

The purposes of this work are two: First, to find the most suitable flotation agent or mixture for obtaining differential selection of galena and sphalerite; second, to find what amounts of the reagents and what conditions are required to obtain the highest possible recovery of both minerals.

In general, the reagents found to give the highest differential selection are common salt (NaCl), sodium carbonate (Na_2CO_3), coal-tar creosote oils, and a few heavy coal-tar oils. Special laboratory distillates from mixtures of different coal-tar creosotes and alcohol, and coal-tar creosotes dissolved in alcohol in an alkaline solution have given encouraging results with some ores.

The chief problem now is how to effect a high recovery of each metallic sulphide at the first differential separation. From the number of tests, more than 700, it has been found that each ore may require a different flotative mixture, and that a certain reagent may act differently on similar ores.

The work at Moscow was in charge of C. A. Wright, metallurgical engineer.

WORK AT THE ALASKA STATION, AT FAIRBANKS.

After the machinery and equipment for the Alaska station at Fairbanks, Alaska, had been installed in quarters furnished by the Fairbanks Commercial Club, this station took up three main lines of endeavor.

The first of these was the supplying of information in regard to the economic minerals, if any, in specimens submitted by prospectors or others engaged in mining development within the Territory of Alaska; this information, based on a qualitative analysis and identification of the minerals, was supplied directly by letter.

A second line of work was supplying information on the best methods, processes, or types of machinery for treating the low-grade ores of Alaska. This information, obtained by tests in the metallurgical laboratory, after being supplied directly to the persons furnishing the ore, will be published in a technical paper. Samples of ore typical of certain districts and selected after a preliminary examination of the mines and mining conditions and methods of concentration, if any, employed in the district were studied under the microscope, by crushing and sifting tests, and by other methods. Test runs on 1 to 5 ton lots of certain ores where then made in order to determine the concentrating machinery or the process best suited for it. After the completion of the metallurgical laboratory in February, three ores were thus tested—a complex lead-silver ore containing zinc and antimony, a free-milling gold ore containing arseno-pyrite, and black sands from a placer clean-up.

A third line of work was supplying information as to the economic minerals known or likely to be found in Alaska, the station maintaining on exhibit a collection of such minerals. This work not only stimulates the interest of prospectors in other minerals than gold, but fosters a spirit of cooperation with the station.

The station has already started cooperative work with the Territorial School of Mines and Agriculture, and with the Tanana Valley Miners Association. This work is proving of mutual benefit.

The technical staff of the Fairbanks station comprised J. A. Davis, superintendent; John Gross, metallurgist, and Paul Hopkins, analytical chemist and mineralogist.

ELECTROMETALLURGICAL INVESTIGATIONS AT THE NORTHWEST STATION, AT SEATTLE.

Work on some of the hydroelectric and electrometallurgical investigations planned for the Seattle station was delayed pending the receipt and erection of the electric-furnace equipment. Attention was given to the problem of recovering tin, lead, and zinc from old tin cans and to electrometallurgical problems of the Pacific Northwest and Alaska.

F. C. Ryan, metallurgist, had immediate charge of these investigations.

RECOVERY OF TIN FROM OLD TIN CANS.

Experiments showed that temperatures high enough to volatilize lead, zinc, and tin could not be maintained in the reverberatory furnace available. Attempts to volatilize tin from tin plate in an electric furnace did not succeed because of unsatisfactory power conditions. Further tests were made in a cupola furnace.

CONCENTRATION OF NICKEL ORE FROM ALASKA.

One of the first problems studied at the northwest station was the concentration of a nickel ore that contained chalcopyrite and pentlandite (nickel ore) in a massive pyrrhotite. By crushing to finer than 100 mesh and using flotation 70 per cent of the copper was recovered as a concentrate assaying more than 20 per cent copper, but no satisfactory separation of the nickel was obtained, and the problem of recovering the nickel was referred to the station at Golden, Colo.

ELECTROMETALLURGICAL PROBLEMS OF THE PACIFIC NORTHWEST.

Work was begun on the compilation of all available data on the potential water power of the Northwest, and of Alaska, information being collected in Washington, Oregon, and Idaho. All the electrometallurgical plants in the Northwest were visited and a report was prepared on the hydroelectric plants of Washington.

MISCELLANEOUS CONCENTRATION TESTS AT THE NORTHWEST STATION.

Among the ores subjected to concentration tests at the northwest station were tin ore from near Spokane, Wash., and from the Black Hills, S. Dak.; manganese ore from Lake Creek, Jackson County, Oreg.; quicksilver ore from California, a complex gold ore from the Gold Hill and Iowa mine at Quartzburg, Idaho, and chrome ores from Washington, Oregon, and California.

PHYSICAL PRINCIPLES OF FLOTATION.

W. H. Coghill, metallurgist at the northwest station, assisted by C. O. Anderson, undertook a study of the physics of flotation. Surface tension, the angle of contact between liquid surfaces and solids, and the spreading of oil on water received especial attention.

The modifying effect of oil on the surface tension of water (22 oils being tried) proved much less than it had been supposed to be. A mathematical equation to express the relation of flotability to the angle of contact between liquids and solids was desired. A method for predicting whether oils would spread on water was developed, as was a drop-weight method of determining surface tension. The principles noted above and some allied topics were published in a technical paper of the Bureau of Mines, entitled "Flotation of Chalcopyrite in the Chalcopyrite-Pyrrhotite Ore of Southern Oregon," and were also set forth in papers published in technical and scientific journals.

ORE-DRESSING PROBLEMS IN OREGON.

G. C. Stowell, of the Oregon Bureau of Mines and Geology, spent half the fiscal year under a cooperative agreement, at the northwest mining experiment station at Seattle, where he gave especial attention to the chrome ores, beach sands, and low-grade quicksilver ores of Oregon.

PETROLEUM DIVISION.

INTRODUCTION.

Problems dealing with the production, distribution and utilization of natural gas, petroleum and petroleum products are being investigated by the Bureau of Mines through its petroleum division.

A large part of the work of this division during the past year has been concerned with questions relating to war-time conditions and to greater efficiency in the utilization of liquid fuels. In the course of this work the Bureau of Mines cooperated with the Indian Office in the prevention of the waste of oil and gas on the Indian lands in Oklahoma, and with the United States Fuel Administration and the different bureaus of the War Department and Navy Department in efforts to increase the efficiency in the utilization of the Nation's fuel supply.

The work of the petroleum division is classified under three heads, as follows: Production technology, engineering technology, and chemical technology. The entire division is under the direction of Chester Naramore, chief petroleum technologist.

Production technology deals with all problems relating to the production of petroleum. The section of engineering technology is under the guidance of C. P. Bowie, with headquarters at San Francisco. This work covers primarily all engineering problems of the petroleum industry, such as storage and transportation of oil, refining of petroleum and its products, as well as problems of gas engineering. The chemical technology of petroleum is directed by E. W. Dean, at Pittsburgh, Pa., where most of the determination of chemical and physical properties of petroleum is done. Within the past fiscal year the Washington laboratory has been equipped so that it now handles a great deal of the work that formerly was done at Pittsburgh.

During the fall of 1917 the bureau felt that while the supply of petroleum and its products at that time was adequate, the war needs would make an unprecedented demand. A conservation campaign on gasoline was started and during the latter months extended to fuel-oil economy. A poster, "Don't waste gasoline," issued in conjunction with the National Automobile Chamber of Commerce and the Council of National Defense, was distributed in all of the large cities in the United States. The poster pointed out several possible ways of saving, many of which could be adapted by the owner of a motor car. The figures and other data on this were compiled by J. H. Wiggins, assistant engineer. J. M. Wadsworth, petroleum engineer, started work aimed to prevent waste in the burning of fuel oils and to effect refinery economies in general.

The petroleum division has given preference to war work investigations; as a result it has been able to complete reports relating to such work promptly and satisfactorily, and to direct important investigations. A great deal of the war work is highly confidential.

PRODUCTION TECHNOLOGY.

COOPERATIVE INVESTIGATIONS.

The section of production technology has cooperated with the Indian Office and the General Land Office. The oil and gas inspectors have materially aided in the conservation of oil and gas and the protection of sands against the encroachment of water from improperly drilled wells. This work was under the direction of V. L. Conaghan until April 15, 1918, when he resigned to take charge of test wells for oil in the British Isles. Mr. Conaghan was succeeded by A. A. Hammer. The borings in England are to be very deep and the bureau has assisted the British Government through its agents, Pearson & Son (Ltd.), in several ways, as discovery of oil in commercial quantities near the fighting front would be of material assistance to the allies. Mr. Conaghan and M. A. LaVelle, expert drillers, are to superintend the drilling.

In field examinations in the California oil fields made for the Land Office, E. W. Wagy studied the means of preserving the lands from waste and injury by infiltrating waters. A similar study was made by Mr. Wagy in the Boulder field of Colorado.

Members of the petroleum division have acted in an advisory capacity to many Government war bureaus and have assisted in the preparation of special reports and of data to such organizations as the War Trade Board, Capital Issues Committee, United States Fuel Administration, and United States Shipping Board.

USE OF CEMENT TO SHUT OFF WATER.

A special effort has been made to prove to the operators of the Mid-Continent field the possibilities of protecting oil sands from invading waters by the use of cement. The operators have gladly supported this work, and decidedly satisfactory results have been obtained. Oil and gas inspectors in the Indian Office, under the direction of A. A. Hammer, chief oil and gas inspector, made a special study of the Healdton field.

A large number of operators are now not only convinced of the advantage of using cement for shutting off bottom water, but are also using it in strings of casing to shut off water above the oil or gas sand. Such work has also impressed on them the inadvisability of shooting wells so near the point of landing pipe. Similar efforts have been made in the fields of southern Kansas, where much loss of oil and gas has been caused through water entering the productive sands. Thus far only a few wells have been cemented, but the results to date are on the whole successful. An endeavor is now being made to bring the operators in the El Dorado and Augusta fields of Butler County, Kans., together for the purpose of forming an organization to study the water problems there. This plan has been heartily indorsed by the United States Fuel Administration. The work is under the active direction of J. O. Lewis.

Cooperative work with the State Geological Survey of Illinois has been carried on in the Illinois field by F. B. Tough. The purpose of this work is to correct water problems as well as to show the operators the benefit of subsurface study in detecting the source of waters. Mr. Tough has prepared a bulletin, now in press, on "Methods of Shutting Off Water in Oil and Gas Wells," which should be of great assistance to operators.

A paper, "Oil Field Water Problems and Methods of Correction," is in preparation by A. W. Ambrose.

OIL-FIELD PRODUCTION.

A paper entitled, "The Decline and Ultimate Production of Oil Properties," by C. H. Beal, is practically completed. This paper includes the composite decline curves of nearly all the important oil fields of the United States. It contains much information on production per acre in different fields and data on methods of appraisal of oil properties, which will be of use to oil operators, engineers, and geologists.

In conjunction with the United States Fuel Administration and the California State Mining Bureau, a study was made of the possibilities of increasing production in California during the next year.

A report on the demand for oil-well casing in the United States was made under the direction of Mr. Ambrose for the War Trade Board in order to determine whether it was advisable to allow casing to be exported. An actual census of all the casing in the United States was taken by the different technical men in the bureau. This report necessitated a study of the steel plate available for pipe, as well as a study of the oil situation in fields that were furnishing petroleum and its products to the allies.

OCCURRENCE OF OIL, GAS, AND WATER.

R. V. Mills, petroleum technologist, is to study the occurrence and relation of gas, oil, and water in different fields, and the factors controlling the modes of occurrence. In this work an effort will be made to supplement the field study with laboratory investigations. Such a study should develop interesting information on the deep-seated movement of gas, oil, and water and their rearrangement incident to production.

REFINERY STATISTICS.

Monthly reports are issued on refinery operations throughout the various districts in the United States; these show the crude oil used by and the output of refineries. The figures serve the United States Fuel Administration in determining the status of the different refined products, and are furnished to other Government bureaus as well as to persons interested in the petroleum industry. These reports are compiled by H. F. Mason, petroleum economist.

ENGINEERING TECHNOLOGY.

OIL STORAGE.

During the year a report entitled "Oil Storage Tanks and Reservoirs," by C. P. Bowie, petroleum engineer, was published as Bulletin 155. This bulletin deals with oil-storage conditions in the United States, and gives specification for the construction of a 55,000-barrel, all-steel tank, and a 750,000-barrel concrete-lined reservoir; it also discusses losses of oil in storage and suggests various practical means for preventing such losses. Following these suggestions would result in saving large quantities of gasoline now being lost by evaporation. It is proposed to start a systematic effort to obtain all possible data regarding evaporation from oil in storage. Recording instruments attached to tanks and reservoirs typical of accepted construction will give accurate information on evaporation losses.

OIL FIRES.

Losses from oil and gas fires in the United States for the 10-year period, January 1, 1908, to January 1, 1918, amounted to approximately $25,254,000, and these fires consumed 12,850,000 barrels of oil and 5,024,506,000 cubic feet of gas. Investigations have been conducted by the Bureau of Mines under the direction of C. P. Bowie in an effort to determine the causes of these fires, suggesting means whereby they might be more successfully combated, and, in many places, perhaps eliminated entirely. A report on the investigations, to be published as Bulletin 170, "Extinguishing and Preventing Oil and Gas Fires," is in press. This bulletin discusses the various methods now in successful use for overcoming such fires, and lays especial stress on the "frothy-mixture" system for extinguishing oil-tank fires. Several methods that have been successfully used for fires at large oil and gas wells are also described, and numerous suggestions, many of which are in advance of general practice, are offered for preventing fires in the future.

OIL-CAMP SANITATION.

The subject of proper sanitation at oil camps and pumping stations is being investigatod by C. P. Bowie, who is preparing a report that will suggest many much-needed improvements in the methods for disposing of sewage, garbage, kitchen slops, and barnyard wastes at storage farms, pumping stations, oil camps, and refineries.

Mr. Bowie spent considerable time during the year in an advisory capacity with the Bureau of Yards and Docks of the Navy Department, as well as serving as technical advisor to the United States Fuel Administration.

REFINERY OPERATIONS.

A bulletin entitled " Removal of the Lighter Hydrocarbon of Petroleum by Continuous Distillation," by J. M. Wadsworth, petroleum engineer, is soon to be published. This bulletin describes in detail various representative topping plants, and gives their method of operation and various data on the oils treated. The thermal efficiency of the various types of plants is compared, and considerable experimental data and various computations are presented to show the rates of heat transmission in stills, coolers, condensers, etc. The work comprehensively covers the topping industry to date and should prove of considerable value in the construction of new plants and the improvement of existing ones.

A report on refinery economies, now being prepared by Mr. Wadsworth, will contain a résumé of oil refinery practice in heat recovery, heat exchanges, and air-cooling methods. The work, which is based on the inspection of practically every refinery in the West and Middle West, is expected to be of considerable service to the refiner in acquainting him with the most modern practice and in encouraging efforts for improved construction.

Mr. Wadsworth studied the uses of powdered coal as fuel and the methods of burning it; also the operation of by-product coking plants in Oklahoma, Illinois, New York, Connecticut, and Pennsylvania. In addition, he did cooperative work with the Submarine Defense Association on the U. S. S. *Gem*, making tests of a colloidal fuel, a combination of powdered coal and oil.

ECONOMY IN THE USE OF OIL FUEL.

A small handbook on the use of fuel oil was completed during the year and will soon be published in cooperation with the United

States Fuel Administration. Prepared for distribution among oil users it is intended to aid the campaign for fuel economy begun by J. M. Wadsworth, consulting engineer for the Fuel Administration. Mr. Wadsworth drew up a pledge card that gave power-plant owners and operators practical suggestions for fuel economy. This card was distributed by the United States Fuel Administration to about 2,000 signers in California, and an efficiency engineer, under the direction of the Fuel Administration, is now visiting the various plants to offer helpful suggestions and to conduct tests.

RECOVERY OF GASOLINE FROM NATURAL GAS.

During the year Bulletin 151, "Recovery of Gasoline from Natural Gas by Compression and Refrigeration," by W. P. Dykema, assistant petroleum engineer, was completed, thereby furnishing the petroleum industry long-needed information. This report treats of the compression and refrigeration process for the recovery of gasoline from natural gas from the viewpoints of the practical engineer and the business man, presenting the variations existing in methods in such manner that different operating conditions and methods can easily be compared. The bulletin represents the results of a careful investigation of practically every plant in the United States, and hence furnishes the plant operator much information not otherwise obtainable.

A study of the recovery of gasoline from natural gas by the absorption method is being made by Mr. Dykema.

Maps of those parts of Osage County, Okla., open to leasing and the elevation of wells therein have been prepared and are being furnished to the operators. This work, as well as other engineering work in connection with the United States Fuel Administration, has been carried on by A. R. Elliott, assistant engineer.

GAS TRAPS FOR OIL WELLS.

A paper on gas traps, prepared by W. R. Hamilton, consulting petroleum engineer, and now in course of publication, deals with traps for the separation of gas from oil.

Estimates were made by W. P. Dykema and J. H. Wiggins for a gathering system to supply gas for the Charleston armor plant of the Navy Department at Charleston, W. Va.

CHEMICAL TECHNOLOGY.

ROUTINE EXAMINATIONS.

The routine work of the chemical section at the Pittsburgh experiment station consisted largely of inspecting fuel oil purchased for the War Department. In this work 275 samples were analyzed.

These samples represented deliveries amounting to nearly 20,000,000 gallons of fuel oil, worth approximately $800,000. About 60 samples of crude oil were analyzed, most of them at the request of the United States Geological Survey. Some 60 samples of lubricating oil were tested, also 135 samples of gasoline, many of these latter being in connection with an investigation of fuel for airplane motors. About 95 miscellaneous products were tested, including products of special cracking processes, alleged gasoline improvers, gun greases, and coal-tar derivatives.

The routine work of the Washington laboratory consisted in analyzing 260 samples of gasoline—submitted by various Government establishments and bureaus, including the Federal Trade Commission, Signal Corps, Quartermaster Corps, and the Panama Canal Commission—and a number of alleged gasoline improvers and gasoline substitutes. In conjunction with the War College tests were made of the Dunn trench heater. In addition Mr. Perdew held frequent conferences regarding satisfactory specifications for airplane and motor fuels with members of different Government agencies.

INVESTIGATIONS.

As practically all the investigations undertaken by the section have had a military bearing, they obviously can not be described in detail at present. However, the general nature of the work in several of them is mentioned below. The work of the various chemists has been largely interlinked. E. W. Dean, organic chemist; W. E. Perdew, chemical engineer; H. H. Hill, assistant chemist; Clarence Netzen, chemical engineer; J. P. Smootz, assistant petroleum chemist; and W. A. Jacobs, assistant chemical engineer, have been actively engaged in most of the investigations.

STUDY OF FUEL FOR AIRPLANE ENGINES.

The work has been directed toward ascertaining (1) what type of fuel among those fuels now commercially produced is most suitable for airplane engines, and (2) whether it is possible to obtain special fuels that are more desirable than any types now in use.

This work has been in cooperation with various organizations, chief among which are the aviation section of the Signal Corps, the United States Bureau of Standards, the research organizations of the Dayton-Wright Airplane Co., and the Dayton Engineering Laboratories Co. The Bureau of Mines has given the full time of two chemists, Clarence Netzen and J. P. Smootz, to this investigation, and part of the time of several other men. The work has included the collection of general information through conferences with engineers engaged in the production or operation of engines, in dynamometer tests and flying tests, in the analysis of fuels already in use, including samples of German gasoline, and in preparing and testing special fuels.

As a result of this work the Bureau of Mines has been able to assist in writing the tentative specifications recently adopted for three grades of airplane gasoline. In addition special fuels have been found that promise to render possible notable increases in the power output of airplane engines.

STUDY OF LUBRICANTS FOR AIRPLANE AND TRUCK MOTORS.

Much of the work pertaining to lubrication has dealt with the laboratory testing of oils. A vacuum distillation method has been developed for determining the degrees of volatility of various oils. In addition, a number of oils have been analyzed to determine their suitability for use in motors of high power or to study the changes through use for considerable periods of time. E. W. Dean and H. H. Hill have directed this work.

STUDY OF CRACKING PROCESSES.

Laboratory experiments on the production of gasoline by vapor-phase cracking methods have been continued, and a detailed investigation has been made of one plant using such a process. Other processes of cracking petroleum products have been investigated in a general way and the information obtained should prove of utmost value in the event of an immediate need arising to develop cracking processes for increasing the supply of motor fuel. This work has been carried on by E. W. Dean and W. A. Jacobs.

TESTING OF GASOLINE ENGINES.

Apparatus for making dynamometer tests of gasoline engines is now being set up and adjusted by W. A. Jacobs. A series of experiments will begin at an early date.

INVESTIGATION OF OIL SHALES.

The bureau has assisted in different ways the operators desiring information on proposed methods of extracting oil from the vast deposits of oil shale in Colorado and Utah. As the possibilities are almost unlimited, it is hoped processes will be developed by which the oil-shale industry can compete successfully as a source of oil.

Thirty-five shales were subjected to destructive distillation and the yield of oil and of permanent gases were determined. This work was done by W. E. Perdew, M. J. Gavin, and C. R. Bopp in connection with work by D. T. Day, consulting chemist. Investigations were also made by W. D. Bonner, consulting chemist, at Salt Lake City, Utah.

MISCELLANEOUS.

A bulletin entitled "Bibliography of Petroleum and Allied Substances, 1915," prepared by Miss E. H. Burroughs, was issued during the year as the first of a series of such bibliographies that the bureau plans to publish yearly. Because of its wide scope this bulletin should be appreciated by all persons interested in the study of petroleum and allied substances.

A report of an investigation made during the preceding fiscal year was issued in December, 1917, as a technical paper on "Determination of Unsaturated Hydrocarbons in Gasoline," by E. W. Dean and H. H. Hill.

CHEMICAL-RESEARCH LABORATORIES.

ANALYTICAL LABORATORY.

Samples of fuel belonging to the Government and samples of fuels and various other substances collected in the course of investigations being made by the United States and by State geological survey and experiment stations are analyzed in the general analytical laboratory at the Pittsburgh station.

The samples analyzed include coal, coke, peat, lignite, coal dust, mine-road dust, clinkers, slags, mine water, minerals, ores, metals, and miscellaneous materials.

During the year 570 samples of coal, coke, and lignite were received for analysis. These were collected in the course of various investigations and of cooperative work with the United States Geological Survey, Navy Department, War Department, Indian Service, Panama Canal, and the Illinois State Geological Survey.

From the mining division of the bureau there were received 567 samples of coal, road, rib, stone, and coked dusts taken in the course of investigations of explosions and fires in coal mines; 25 samples of pyrite taken in connection with investigations of sources of pyrite for acid manufacture; 12 samples of rock dusts and drill cuttings collected in connection with the investigation of silicosis among the miners in the copper mines of the Butte, Mont., district; and 9 samples of miscellaneous materials; making a total of 613 samples from the mining division.

From the fuels and mechanical-equipment division of the bureau there were received 339 samples of coal, ash, clinker, and residual fuel taken in connection with steaming and heating tests of coal for the Army, and with combustion investigations having in view the more efficient utilization of coal in boiler furnaces; 161 samples of coal and coke taken in connection with the Roberts coke-oven investigation in cooperation with the Bureau of Standards; 2 samples of coke taken in connection with the coking of Illinois coals in cooperation with the Illinois State Geological Survey; and 3 samples of miscellaneous materials, making a total of 505 samples.

From investigations being conducted in the chemical research laboratory at the American University Experimental Station, Washington, D. C., there were received 301 samples, mostly of materials tested as absorbents of noxious gases.

In all 2,019 samples were received. Their analysis involved 17,477 determinations.

Considerable time was given to moving and installing chemical equipment in the new chemical laboratories of the Bureau of Mines in Pittsburgh.

The analytical laboratory was under the supervision of A. C. Fieldner, chemist, assisted by W. A. Selvig, assistant chemist in charge, who reported to C. F. Parsons, chief chemist of the bureau.

The personnel of the laboratory during the year included: F. D. Osgood, assistant chemist, and G. H. Mengel, W. R. Collette, O. C. Brown, L. R. Eckman, B. B. Westcott, I. S. Guest, J. I. Priest, junior chemists.

INVESTIGATIONS OF THE FUSIBILITY AND CLINKERING OF COAL ASH.

Investigations of the fusibility of coal ash from the coals of the States of Pennsylvania, Virginia, West Virginia, Indiana, Illinois, and Maryland were practically completed and tabulation of the results was begun. The method employed in determining fusibility consists of fusing the ash in a modified gas-heated furnace, a reducing atmosphere being maintained by using a volume of gas largely in excess of that required for complete combustion.

This investigation is under the supervision of A. C. Fieldner, chemist, assisted by W. A. Selvig, assistant chemist in charge. The personnel included: C. R. Locke, C. S. Purcell, V. C. Allison, W. C. Ratliff, and B. B. Wescott, junior chemists, for different periods of time during the year.

INVESTIGATION OF MINE GASES AND OF NATURAL GAS.

ROUTINE ANALYSES.

Many samples of mine air collected in the course of investigations in mines after fires and explosions or in studying the ventilation of mines were analyzed in the gas laboratory at Pittsburgh, as well as many samples of natural-gas air, gasoline air, hydrogen-air and benzol-air mixtures collected in the various testing galleries of the Pittsburgh station. These galleries are used for testing explosives, miners' electric lamps, miners' oil lamps, methane detectors, carbon-dioxide and oxygen detectors, and for various other purposes.

Numerous samples of mine air submitted by mine operators or State mine inspectors were analyzed in order to ascertain how dangerous conditions in certain mines could be bettered. Other samples analyzed were from the experimental mine at Bruceton, Pa.; they comprised those taken from time to time to detect any change in the gaseous nature of the mine, those taken after definite amounts of natural gas had been added in order to determine the effect of mixtures of gas, coal dust, and air on promoting explosions, and the samples automatically taken during explosions. Still other samples analyzed included the following: Those taken by the gas laboratory to solve some particular investigation; special samples submitted by the Army and Navy; samples collected in cooperative work with State mining bureaus; samples from breathing apparatus and samples of oxygen made by the electrolytic and the liquid-air process; natural-gas samples sent by employees of the bureau and of the United States Geological Survey; samples of gases requiring fractionation at low temperatures and pressures; and samples of miscellaneous gases.

SPECIAL WORK.

STENCHES AS DANGER SIGNALS.

Work was done and a report prepared on stenches for use as a warning in mines. Electric gongs have been used in mines as a means of signaling fires or other serious danger, but have not proved wholly satisfactory. Hence, the use of a stench in the compressed air delivered to all parts of the mine, where it would escape from leaks or machines, is offered as a substitute for the electric signals. The minimum concentration at which odors of a number of stenches could be detected in a current of moving air was determined in the laboratory, and the more promising stenches were tested at the experimental mine. The results obtained indicated that this method of signaling will be of great value for warning miners and may be the means of saving a great many lives.

A report was submitted on a new method developed for determining small percentages of sulphur dioxide in metal mines. By this method mining engineers who have no special training in chemistry can make tests quickly and easily in the mine where the samples are taken. The apparatus is cheap and all broken parts are easily replaced.

A new method of making a complete analysis of gases used in warfare was devised; the method requires the use of low temperatures and pressures. A large number of gas samples were analyzed by this method.

Work was done on the removal of undesirable gases from the atmosphere of submarines.

Certain gases submitted by the Army and Navy were analyzed by fractionation at low temperatures and pressures to determine the percentage of certain constituents.

In cooperation with the American University station, work was done on the improvement of a methane detector and the devising of a carbon dioxide and oxygen detector.

A new apparatus for determining the percentage of saturation of carbon monoxide in the blood was designed, this apparatus being more accurate than those previously used. Samples of blood from men who died in mines were analyzed to determine the possible effect of carbon monoxide in causing death.

Commercil apparatus for testing gases was tested.

Improvements were made in the designs of apparatus for analyzing gases.

PERSONNEL.

The gas laboratory has been supervised by A. C. Fieldner, chemist. The personnel during the year included the following chemists who were employed for different lengths of time: A. W. Gauger, junior chemist in charge; S. H. Katz, assistant chemist; G. W. Jones, assistant chemist; V. C. Allison, assistant chemist; J. F. Duggar, W. C. Harpster, M. H. Meighan, W. M. Janney, and W. L. Parker, junior chemists.

PHYSICAL LABORATORY.

The physical laboratory at the Pittsburgh station of the Bureau of Mines is equipped for testing and calibrating physical apparatus and measuring instruments used in the work of divisions of the bureau and for making a number of tests that require apparatus not usually found in an ordinary laboratory. During the year 73 calibrations and tests were made, which included calibrations of potentiometers, millivoltmeters, sling pyschrometers, and mercury thermometers.

A. O. Ashman, laboratory assistant in physics, was in charge of the laboratory until November 15. As no one was in charge thereafter until June 13, when F. C. Houghten, assistant physicist, took charge, the number of calibrations and tests made were much less than during the previous year.

MICROSCOPIC INVESTIGATIONS OF COAL, COAL DUST, ROCK DUST, AND MISCELLANEOUS MATERIALS.

The manuscript of a bulletin entitled "Structures in Paleozoic Coals" was submitted for publication.

During the year a number of microscopic examinations were made of coal dust, rock dust, charcoal, and of miscellaneous material submitted by various divisions of the bureau.

The work, which was done at the Pittsburgh station, was in charge of Reinhardt Thiessen, assistant chemist.

ADMINISTRATION.

FINANCIAL STATEMENT.

The total sum appropriated by Congress for the expenses of the Bureau of Mines during the fiscal year ended June 30, 1918, was $1,663,287.63.

Below is a statement showing the appropriations made and the sum distributed under each appropriation.

Amounts appropriated for and expended by the bureau for the fiscal year ended June 30, 1918.

Title.	Amounts.	Repayments.	Available.	Disbursements.	Balance available subject to vouchers or claims.
General expenses	$73,300.00	....	$73,300.00	$72,617.52	$682.48
Investigating mine accidents	353,800.00	$169.85	353,969.85	346,969.07	7,000.78
Testing fuel	135,000.00	....	135,000.00	130,506.24	4,493.76
Mineral-mining investigations	100,000.00	....	100,000.00	98,282.38	1,717.62
Inspecting mines in Alaska	7,000.00	....	7,000.00	5,718.79	1,281.21
Books and publications	1,500.00	....	1,500.00	1,442.81	57.19
Land for mine-rescue cars	1,000.00	....	1,000.00	70.00	930.00
Investigations of petroleum and natural gas	100,000.00	....	100,000.00	98,336.27	1,663.73
Removal mining-experiment station, Pittsburgh, Pa	46,217.63	....	46,217.63	39,444.29	[a] 6,773.34
Care, etc., new buildings, Bureau of Mines, Pittsburgh, Pa	17,220.00	....	17,220.00	13,696.09	3,523.91
Purchase of mine-rescue cars	81,750.00	....	81,750.00	81,750.00	....
Equipment for mine-rescue cars	13,500.00	....	13,500.00	12,943.95	556.05
Operating mine-rescue cars	98,000.00	....	98,000.00	80,000.83	17,999.17
Expenses mining-experiment stations	150,000.00	....	150,000.00	143,300.10	6,699.90
Improvement of grounds, etc., Pittsburgh and Bruceton, Pa	35,000.00	....	35,000.00	15,164.31	[a] 19,835.69
Enforcement of the act to regulate explosives	300,000.00	....	300,000.00	205,641.91	[a] 94,358.09
War-materials investigations	150,000.00	....	150,000.00	17,824.35	[a] 132,175.65
Total	1,663,287.63	169.85	1,663,457.48	1,363,708.91	299,748.57

[a] Unexpended balances available during fiscal year 1919.

The various sums expended by the Bureau of Mines under allotments made by the Department of War and the Department of the Navy are shown below:

Amounts allotted to and expended by the Bureau of Mines in investigations for the War and Navy Departments during the fiscal year ended June 30, 1918.

Investigation.	Source of funds.	Amount allotted.	Amount disbursed.	Balance subject to voucher or claim.
Gas investigations	War Department	$2,212,000.00	$2,208,143.60	$3,856.40
	Navy Department	250,000.00	249,229.31	770.69
Balloon gases	War and Navy Departments	247,000.00	236,214.96	10,785.04
Carbide furnace	War Department	3,000.00	553.15	2,446.85
Oxygen apparatus experiments	do	100,000.00	66,122.50	33,877.50
Chemical plant No. 4	do	250,000.00	27,330.49	222,669.51

MAILS AND FILES.

More than 500,000 pieces of mail matter, most of which related purely to war work, were handled by the mails and files section at the Washington office during the year. The increase in the amount handled necessitated the establishment of a separate mailing room with a clerk in charge and required the services, at various times, of between six and eight file clerks.

PERSONNEL.

On June 30, 1918, there were 648 employees on duty in the Bureau of Mines, 573 of whom held Secretary's appointments, they being distributed and classified as indicated in the following table:

Number of appointees on duty in the Bureau of Mines June 30, 1918.

Location.	Classification and number of appointees.			
	Technical.	Clerical.	Nonclerical.	Total.
Washington	[a] 43	68	[b] 30	141
Pittsburgh	[c] 113	35	[d] 46	194
Field in general	[e] 191	35	12	238
Total	347	138	88	573

[a] Engineers, 14; chemists, 16; miscellaneous, 13.

[b] Includes such employees as elevator conductor, electrician, watchman, messenger, laborer.

[c] Engineers, 46; chemists, 30; miscellaneous, 37.

[d] Includes such employees as fireman, watchman, oiler, carpenter, shotfirer, janitor, machinist's helper, laborer.

[e] Engineers, 81; chemists, 37; miscellaneous, 73.

In addition to the employees enumerated in the preceding table there were 75 unskilled laborers, including cooks, employed on field agreement, 36 of whom were in Pittsburgh and 39 in the field in general, or a total of 648 employees on duty June 30, 1918, an increase of 114 appointees and a decrease of 16 on field agreements as compared with the preceding fiscal year.

The total number of changes in status requiring the approval of the Secretary of the Interior and consisting of appointments, reinstatements, transfers, promotions, reductions, separations, extensions of limited appointments, etc., was 1,114. The number of changes in status on field agreements issued by the Director with the approval of the Secretary of the Interior and including employment, separation, promotion, extension, or reduction, was 1,010, or a total of 2,124 in all being an increase of 1,094 from the preceding fiscal year.

The personnel of the Bureau of Mines was greatly increased during the past fiscal year by the enforcement of the act of October 6, 1917 (40 Stat. L., 385), regulating the manufacture, distribution, storage, use, and possession of explosives, with which the Director was charged, and by the establishment of the American University Experiment Station under allotments from appropriations to the War and Navy Departments for the purpose of making gas investigations in connection with the war.

The classification and distribution of employees in connection with the enforcement of the explosives act are as follows.

Classification and number of employees in connection with explosives regulation.

Classification.	Washington Office.	Field.
Technical	9	[a] 53
Clerical	50	46
Nonclerical	2	0
Total	61	99

The following table shows the classification and distribution of the employees in connection with work turned over to or being conducted in cooperation with the War Department and the Navy Department.

Classification and distribution of employees in connection with cooperative work with the Army and Navy.

Location.	Classification and number of employees.			
	Technical.	Clerical.	Noncleri-cal.	Total.
Gas investigation: [a]				
At American University Experiment Station, District of Columbia	[b] 226	156	[c] 368	750
In the field	[d] 120	6	[e] 12	138
Oxygen apparatus investigation: [a]				
In the field under Washington office	7	1	1	9
Chemical plant No. 4:				
Washington office	3	4	[f] 1	8
In the field	2	....	....	2
Balloon gases:				
Washington office	....	2	....	2
In the field	15	....	[g] 3	18
Total	373	169	385	927

[a] On duty at close of June 24, 1918; transferred to War Department by Executive order, June 25, 1918.
[b] Engineers, 59; chemists, 107; miscellaneous, 60.
[c] Includes watchmen, messengers, carpenters, cabinetmakers, blacksmiths, chauffeurs, electricians laboratory assistants and helpers, laborers, etc.
[d] Engineers, 28; chemists, 62; miscellaneous, 30.
[e] Includes laboratory helpers, laboratory assistants, janitors, mechanics, etc.
[f] Messenger.
[g] Mechanics.

In addition two officers of the Army were detailed on the work on alloys at Cornell University, and one officer was engaged on chemical work at the Washington office of the bureau.

PUBLICATIONS.

The publications of the Bureau of Mines are divided into three classes—bulletins, technical papers, and miners' circulars. In addition, the bureau issues a monthly statement of fatalities in coal mines, the annual report of the director, and miscellaneous publications, including handbooks on special subjects, posters, charts, lists and schedules.

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[a] Includes 49 explosives inspectors and 4 consulting engineers.

Among the bulletins are included the reports that present the detailed results of technical and scientific investigations; hence, these are of interest chiefly to engineers, chemists, mine officials, and other persons familiar with the subjects discussed. The technical papers are shorter and less formal than the bulletins, and contain preliminary statements on the results or the progress of broad investigations, or describe the small investigations incidental to larger ones. The miners' circulars deal with such practical matters as accident prevention and rescue and first-aid methods, the safeguarding of health, and other topics that directly concern the workers in mines, mills, and metallurgical plants. In order that they may be of most value to the persons to whom they are addressed, the circulars are written in simple, nontechnical English, and are printed in much larger editions than are the bulletins and technical papers. One of the circulars, that on first aid for miners, is printed in Italian, Polish, and Slovak, with the English translation on opposite pages.

The bulletins and technical papers issued during the fiscal year ended June 30, 1918, are summarized in the following statement:

BULLETINS.

Bulletin 103. Mining and Concentration of Carnotite Ores, by K. L. Kithil and J. A. Davis. 1917. 124 pp., 14 pls., 5 figs.

Describes methods used by Bureau of Mines.

Bulletin 110. Concentration Experiments on the Siliceous Red Hematites of the Birmingham District, Ala., by J. T. Singewald, jr. 1917. 91 pp., 1 pl., 47 figs.

Detailed results of experiments to show possibility of obtaining, from lean siliceous hematites, concentrates rich enough for smelting.

Bulletin 131. Approved Electric Lamps for Miners, by H. H. Clark and L. C. Isley. 1917. 59 pp., 17 pls, 7 figs.

Shows types of lamps that have passed tests by Bureau of Mines and describes tests.

Bulletin 132. Siliceous Dust in Relation to Pulmonary Disease in the Joplin District, Mo., by Edwin Higgins, A. J. Lanza, F. B Laney, and G. S. Rice. 1917. 166 pp., 16 pls., 6 figs.

Discuss origin of the dust in the air of the mines, and methods of abatement; character of the rocks that yield the dust in drilling; and reviews history of miners' consumption.

Bulletin 135. Combustion of Coal and Design of Furnaces, by Henry Kreisinger, C. E. Augustine, and F. K. Ovitz. 1917. 140 pp., 1 pl., 45 figs.

Discusses the burning of coal on the grate and of volatile matter in the combustion space above the fuel bed.

Bulletin 136. The Deterioration of Stored Coal, by H. C. Porter and F. K. Ovitz. 1917. 38 pp., 7 pls.

Covers the results of storage for five years, under widely different conditions, of samples of coal from Pennsylvania, West Virginia, and Wyoming; shows small loss of heating value of bituminous coal during storage.

Bulletin 137. The Use of Permissible Explosives in the Coal Mines of Illinois, by J. R. Fleming and J. W. Koster. 1917. 106 pp., 8 pls., 17 figs.

Describes methods used in shooting coal with permissible explosives.

Bulletin 139. Control of Hookworm Infection at the Deep Gold Mines of the Mother Lode, California, by J. G. Cumming and J. H. White. 1917. 53 pp., 1 pl., 5 figs.

Points out prevalence of hookworm infection and the measures being taken to abate the disease.

Bulletin 140. Occupational Hazards and Accident Prevention at Blast-Furnace Plants; based on Records of Accidents at Blast Furnaces in Pennsylvania in 1915, by F. M. Willcox. 1917. 155 pp., 16 pls.

Bulletin 141. Yearbook of the Bureau of Mines, 1916, by Van. H. Manning. 1918. 174 pp., 17 pls., 8 figs.

Reviews investigations conducted during the year, points out their significance, and shows their relation to the problems of the mineral industries of the country.

Bulletin 145. Measuring the Temperature of Gases in Boiler Settings, by Henry Kreisinger and J. F. Barkley. 1918. 72 pp., 31 figs.

Intended for boiler-room operators, testing engineers, and others. Presents results of temperature measurements in common types of boilers and discusses errors in usual methods of measurement.

Bulletin 146. The Technology of Salt Making, by W. C. Phalen. 1917. 144 pp.

A review of the salt industry, with description of methods and equipment.

Bulletin 148. Methods of Increasing the Recovery of Oil from Wells, by J. O. Lewis. 1917. 128 pp., 4 pls., 32 figs.

Describes particularly the application of compressed air.

Bulletin 149. Bibliography of Petroleum and Allied Substances, 1915, by E. H. Burroughs. 1917. 147 pp.

Bulletin 151. Recovery of Gasoline from Natural Gas by Compression and Refrigeration, by W. P. Dykema. 1918. 123 pp., 15 pls., 15 figs.

Treats of the compression and refrigeration process for the recovery of gasoline from natural gas from the viewpoints of the practical engineer and the business man.

Bulletin 152. Abstracts of Current Decisions on Mines and Mining, January to April, 1917, by J. W. Thompson. 1917. 79 pp.

Bulletin 153. The Mining Industry in the Territory of Alaska During the Calendar Year 1916, by S. S. Smith. 1917. 89 pp.

Reports progress made in different districts, and discusses mine accidents.

Bulletin 155. Oil-Storage Tanks and Reservoirs, with a Brief Discussion of Losses of Oil in Storage and Methods of Prevention, by C. P. Bowie. 1917. 73 pp., 21 pls.

Bulletin 156. The Diesel Engine, Its Fuels and Its Uses, by Herbert Haas. 1918. 130 pp., 16 pls., 57 figs.

Describes engine as an important device for insuring more efficient utilization of petroleum and coal-tar products for the reason that it consumes heavy liquid fuels such as can not be utilized in other types.

Bulletin 158. Cost Accounting for Oil Producers, by C. G. Smith. 1917. 122 pp.

Presents descriptions and discussions of balance sheets, profit and loss statements, and bookkeeping methods peculiarly adapted to the oil business.

Bulletin 159. Abstracts of Current Decisions on Mines and Mining, May to August, 1917, by J. W. Thompson. 1918. 111 pp.

Bulletin 164. Abstracts of Current Decisions on Mines and Mining, August to November, 1917, by J. W. Thompson. 1918. 147 pp.

TECHNICAL PAPERS.

Technical Paper 91. A Convenient Multiple-Unit Calorimeter Installation, by J. D. Davis and E. L. Wallace. 1918. 48 pp., 6 pls., 13 figs.

Describes a calorimeter outfit for laboratories analysing a large number of coal samples.

Technical Paper 98. Effect of Low-Temperature Oxidation on the Hydrogen in Coal and the Change of Weight of Coal in Drying, by S. H. Katz and H. C. Porter. 1917. 16 pp., 2 figs.

Discusses results of experiments and their significance.

Technical Paper 133. Directions for Sampling Coal for Shipment or Delivery, by G. S. Pope. 1917. 15 pp., 1 pl.

Summarizes information given in Bulletin 116, "Methods of Sampling Delivered Coal, and Specifications for the Purchase of Coal for the Government."

Technical Paper 141. Laboratory Determination of the Inflammability of Coal Dust and Air Mixtures, by J. K. Clement and J. N. Lawrence. 1917. 27 pp.

Describes apparatus and gives results of tests of dusts from a large number of mines.

Technical Paper 144. The Quick Determination of Incombustible Matter in Coal and Rock Dust Mixtures in Mines, by A. C. Fieldner, W. A. Selvig, and F. D. Osgood. 1918. 36 pp.

Describes use of rock dust to prevent coal-dust explosions. Explains the use of modified portable Taffanel volumeter.

Technical Paper 148. The Determination of Moisture in Coke, by A. C. Fieldner and W. A. Selvig. 1917. 13 pp.

Technical Paper 155. Gypsum Products, Their Manufacture and Uses, by R. W. Stone. 1917. 67 pp.

Describes methods of quarrying and dehydrating gypsum, equipment of plants, and gypsum resources of the United States.

Technical Paper 158. Compressibility of the Constituents of Natural Gas, with Composition of the Natural Gas used in 31 Cities in the United States, by G. A. Burrell and I. W. Robertson. 1917. 16 pp., 9 figs.

Technical Paper 162. Initial Priming Substances for High Explosives, by G. B. Taylor and W. C. Cope. 1917. 32 pp.

Discusses use of mercury fulminate, lead hydronitride, and silver acetylide.

Technical Paper 167. Men who Received Bureau of Mines Certificates of Mine Rescue Training, July 1, 1914, to June 30, 1916, by D. J. Parker. 1917. 66 pp.

Technical Paper 169. Permissible Explosives Tested Prior to January 1, 1917, by S. P. Howell. 1917. 19 pp.

Lists and classifies explosives and gives names of manufacturers.

Technical Paper 170. The Diffusion of Oxygen Through Stored Coal, by S. H. Katz. 1918. 49 pp.

Experiments to determine the effects of the size of the coal pieces and the proportion of voids in a coal pile on the rate at which oxygen can travel by diffusion from the air about the pile to the coal within.

Technical Paper 172. Effects of Moisture on the Spontaneous Heating of Stored Coal, by S. H. Katz and H. C. Porter. 1917. 25 pp., 1 pl., 8 figs.

Explains method of experiment and describes apparatus used.

Technical Paper 173. Coke-Oven Accidents in the United States During the Calendar Year 1916, compiled by A. H. Fay. 1917. 22 pp., 5 cents.

Technical Paper 174. Gasoline Mine Motors, by R. H. Kudlich and Edwin Higgins. 1917. 19 pp., 3 figs.

Discusses precautions to be taken in use.

Technical Paper 175. Production of Explosives in the United States During the Calendar Year 1916, compiled by A. H. Fay. 1917.

Gives classes of explosives and distribution by States.

Technical Paper 176. Bibliography of Recent Literature on Flotation of Ores, July 1 to December 31, 1916, by D. A. Lyon, O. C. Ralston, F. B. Laney, and R. S. Lewis. 1917. 27 pp.

Technical Paper 177. Preparation of Ferro-Uranium, by H. W. Gillett and E. L. Mack. 1917. 46 pp.

Refers to importance of uranium as an alloy in steel, and describes experiment in producing ferro-uranium in an electric furnace.

Technical Paper 179. Preparedness Census of Mining Engineers, Metallurgists and Chemists, by A. H. Fay. 1917. 17 pp.

Technical Paper 180. Firing Bituminous Coals in Large House-Heating Boilers, by S. B. Flagg. 1917. 22 pp., 1 pl., 16 figs.

Describes experiments to determine best methods of coal, and savings to be effected.

Technical Paper 181. Determination of Unsaturated Hydrocarbons in Gasoline, by E. W. Dean and H. H. Hill. 1917. 25 pp.

Describes various laboratory methods studied and experiments made in the pressure-cracking process in gasoline production.

Technical Paper 182. Flotation of Chalcopyrite in Chalcopyrite-Pyrrhotite Ores of Southern Oregon, by W. H. Coghill. 1917. 13 pp., 1 fig.

A preliminary report on experiments on certain low-grade ores for the separation of sulphides by flotation.

Technical Paper 183. New Views of the Combustion of the Volatile Matter in Coal, by S. H. Katz. 1917. 15 pp., 1 fig.

Deals with the volatilization of the hydrocarbons in coal and the burning of the volatile matter in the combustion space of the furnace.

Technical Paper 184. Weights of Various Coals, by S. B. Flagg. 1918. 14 pp.

Gives weight per cubic foot.

Technical Paper 185. Use of the Interferometer in Gas Analysis, by F. M. Seibert and W. C. Harpster. 1918. 18 pp., 1 pl., 5 figs.

Describes the outcome of investigations made by the Bureau of Mines in connection with work on mine gases and natural gas.

Technical Paper 187. Slag Viscosity Tables for Blast-Furnace Work, by A. L. Feild and P. H. Royster. 1917. 38 pp., 1 fig.

To help blast-furnace operators to reduce losses caused by off-grade pig iron, to improve fuel economy, and to extend present-day practice to meet the increasing need of smelting lean and complex ores.

Technical Paper 189. Temperature-Viscosity Relations in the Ternary System $CaO-Al_2O_3SiO_2$, by A. L. Feild and P. H. Royster. 1918. 36 pp., 1 pl., 16 figs.

Properties of certain silicates at high temperature; confined to that range of composition found in iron blast-furnace slags. Results have a direct relation to many problems outside the field of iron metallurgy.

Technical Paper 193. Quarry Accidents in the United States During the Calendar Year 1916, compiled by Albert H. Fay. 1917. 58 pp.

Lists fatal and nonfatal accidents classified by counties and States.

Technical Paper 194. Report of the Committee on the Standardization of Mining Statistics, compiled by A. Fay. 1918. 57 pp.

Committee representing State mine inspection and industrial accident commissions recommends standardized forms for the reporting of fatal and nonfatal injuries.

Technical Paper 199. Five Ways of Saving Fuel in Heating Houses, by Henry Kreisinger. 1917. 15 pp., 1 fig.

Briefly describes simple methods by which coal can be saved.

Technical Paper 201. Accidents at Metallurgical Works in the United States During the Calendar Year 1916, compiled by A. H. Fay. 1918. 18 pp.

Lists of fatal and nonfatal accidents by causes and States.

Technical Paper 202. Metal-Mine Accidents in the United States During the Calendar Year 1916, compiled by A. H. Fay. 1918. 91 pp.

Technical Paper 204. Economic Operation of Steam Turbo-Electric Stations, by C. L. Hirshfeld and C. L. Kann. 1918. 29 pp., 5 figs.

Discusses the economies to be effected in the use of fuel through changes in operating methods at large power plants having turbogenerators.

EDITORIAL WORK.

With the increase in the amount of work being done by the bureau there has been an increase in the number of reports prepared for publication and a consequent increase in the amount of editorial work. The editorial section not only edits the manuscript and reads the proof of all reports, lists, and forms printed for the bureau, but also examines all material submitted for illustrations and prepares accepted material for engraving.

During the year 22 bulletins, 33 technical papers, and 15 other publications were issued. The bulletins and technical papers were as follows: Bulletins 103, 110, 131, 132, 135, 136, 137, 139, 140, 141, 145, 146, 148, 149, 151, 152, 153, 155, 156, 158, 159, 164; Technical Papers 91, 98, 133, 141, 144, 148, 155, 158, 162, 167, 169, 170, 172, 173, 174, 175, 176, 177, 179, 180, 181, 182, 183, 184, 185, 187, 189, 193, 194, 199, 201, 202, 204. The contents of the bulletins and technical papers have been summarized in the preceding statement.

The other publications included the annual report of the director, 12 monthly statements of coal-mine fatalities in the United States, a report on first-aid treatment for miners in mines, various posters, lists of publications, and a list of the members of the bureau.

Nine bulletins, 9 technical papers and 1 miners' circular were reprinted in one or more editions.

In addition to the work done on the publications enumerated the text of 29 other publications was edited, and illustrations for these were prepared for engraving.

The editorial work was in charge of S. Sanford, engineer.

DISTRIBUTION OF PUBLICATIONS.

During the fiscal year there were distributed 528,432 copies of publications, consisting of 81,374 bulletins, 168,411 technical papers, 91,459 miners' circulars, 1,894 annual reports, and 185,294 miscellaneous documents.

The number of bulletins and technical papers distributed was larger than that of the previous fiscal year, but there was a decrease of nearly 400,000 in the distribution of miners' circulars. This decrease was probably due to the war and to a lessened interest in safety matters.

The letters of inquiry received by this section totaled 77,167, which is an increase of 15,000 over the previous year. The letters written in response to inquiries totaled 5,921. The pieces of mail sent out reached a total of 648,470. The work of the section was in charge of J. L. Cochrane, statistician.

LIBRARY.

The library system of the Bureau of Mines now consists of a main library in Washington and 13 branch libraries at the mining experiment stations—Columbus, Ohio; Pittsburgh, Pa.; Ithaca, N. Y.; Minneapolis, Minn.; Urbana, Ill.; Bartlesville, Okla.; Golden, Colo.; Salt Lake City, Utah; Tucson, Ariz.; Seattle, Wash.; San Francisco, Cal.; Berkeley, Cal.; and Fairbanks, Alaska.

All books are interchangeable between the stations and there is a daily service to the stations from the main library. With the great increase in the volume of work done by the bureau the appropriation for books and publications has become inadequate for purchasing the highly specialized technical and scientific publications needed. This appropriation has to be divided into 13 allotments in order to provide each of the experiment stations with a small carefully selected reference library, and because of the serious lack of funds only the most urgently needed books and periodicals can be purchased.

War service has greatly taxed the library's resources. Assistance and information have been given to other Government libraries, and to the engineers, chemists, experts, and students who are doing special work for the Army and Navy, and for munitions and other industries. In consequence there is large and growing use of the library as a war-service library.

Through interlibrary loan 1,191 volumes were borrowed and returned; through purchase, exchange, and binding 1,133 volumes were added to the library during the year. Seven hundred and thirty-one volumes, including volumes for the branch libraries, were collated and sent to the bindery.

PITTSBURGH EXPERIMENT STATION.

The administrative work of the Pittsburgh station was directed by Lauson Stone, as superintendent, for three months of the fiscal year, and by W. R. Talbot, as acting superintendent, for the balance of the year. This work is divided into six sections, as follows: Technical service, clerical, purchase and supplies, library and translations, shops and power plant, care of buildings and grounds.

The technical-service section makes drawings and prints of the equipment and apparatus necessary for the prosecution of the various investigations; computations based on the data obtained; and charts, curves, drawings and photographs to illustrate reports and publications. This section also prepares and distributes motion pictures and lantern slides. Much of the year was devoted to computing and reporting chemical analyses of coal; boiler and other fuel tests and explosive tests; obtaining areas of mine workings and computing percentage of extraction of coal from workings; drawing mine disaster maps, chemical apparatus and equipment for the new building; developing and printing field negatives; and photographing apparatus relating to war work.

The clerical section includes stenographers, a personnel, pay roll, and service-voucher clerk, a property clerk, and a file clerk and assistant.

The purchasing office makes all purchases for the plant, aggregating many thousands of dollars annually. The supply room carries in stock a supply of commonly used materials, which are purchased in bulk and issued to various sections on requisition as needed. The supply room also looks after the receiving and shipping of all materials and the issuance of stationery supplies.

The station library contains some 6,000 technical publications and magazines, which are circulated among the employees of the bureau. A subject index to new publications is issued semimonthly.

Many foreign publications are received, and a translator is employed to make translations for section chiefs who wish to keep themselves informed of the latest foreign developments in their special lines of work. During the year translations were made from French, German, Italian, and Spanish publications.

The shops and power plant were under the supervision of a mechanical superintendent, who looked after electrical installations and repairs, general repairs to buildings and equipment, the building of newly designed investigative equipment, plumbing, and upkeep generally. The power plant, now nearing completion, will generate all the steam used for power, heat, and light.

The custodian of buildings and grounds directs the watchmen, janitors, and laborers, and sees that the buildings and grounds are kept in a presentable condition.

REPORT OF THE ST. ELIZABETHS HOSPITAL

OFFICERS OF THE HOSPITAL.

BOARD OF VISITORS.

Brig. Gen. William C. Gorgas, Surgeon General, U. S. A., President of the Board.
Mrs. Henry G. Sharpe.[1]
Mr. Lewis E. Smoot.
Mrs. Archibald Hopkins.
Walter S. Harban, D. D. S.
Rupert Blue, M. D., Surgeon General, P. H. S.
Rear Admiral William C. Braisted, Surgeon General, U. S. N.
Mr. Gilbert H. Grosvenor.
Mr. G. L. Nicolson.

Executive Committee of the Board.

Dr. Blue, Dr. Braisted, Mr. Smoot.

Chaplains.

Rev. C. H. Butler.
Rev. W. G. Davenport.
Rev. John E. Horstkamp.
Rev. Hugh T. Stevenson.
Rev. Geo. M. Cummings.

MEDICAL STAFF.

Superintendent.

William A. White, M. D.

First Assistant Physician.

Ross McC. Chapman, M. D.[1]
James C. Hassall, M. D.

Clinical Director.

Mary O'Malley, M. D.

Scientific Director.

S. I. Franz, A. B., Ph. D., LL. D., M. D.

Clinical Psychiatrist.

Edward J. Kempf, M. D.

Assistant Clinical Psychiatrist.

Lucile Dooley, Ph. D.

Senior Assistant Physicians.

Alfred Glascock, M. D.[1]
John P. H. Murphy, M. D.
John E. Lind, M. D.
John A. Pfeiffer, M. D.
Samuel A. Silk, M. D.
Arrah B. Evarts, M. D.

Assistant Physicians.

D. G. O'Neil, M. D.[1]
Anita A. Wilson, M. D.[1]
Mildred E. Scheetz, M. D.
Leon E. Duval, M. D.

Junior Assistant Physicians.

Hagop Davidian, M. D.
David G. Sampson, M. D.[1]
Helen D. Kempf, M. D.
Elmer B. M. Casey, M. D.
Herman P. Hyder, M. D.
Elsa B. Will, M. D.

Medical Internes.

Vachelle E. Harmon, M. D.[1]
Burgh S. Burnet, M. D.[1]
Ina L. Moore, M. D.

Military Assignments.

From the Navy.
Dallas G. Sutton, M. D., Surgeon, U. S. N.

From the Army.
Wm. A. Searl, Captain Medical Corps, U. S. A.

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[1] Resigned.

Visiting Dentist.

A. D. Weakley, D. D. S.

Resident Dentist.

Adolph Jacobs, D. D. S.

Visiting Ophthalmologist.

Arthur H. Kimball.[1]
Charles L. Billard, M. D.

Veterinarian.

John P. Turner, V. D. M.[1]
C. E. Dornheim, V. D. M.

Steward.

Monie Sanger.

Disbursing Agent.

Geo. W. Kreis.

Chief Clerk.

Frank M. Finotti.

Purchasing Agent.

A. E. Offutt.

Matron.

H. O'Brien.

Chief of Training School.

Miss Alice Vaughn.

CONSULTING STAFF.

Internal Medicine.

Dr. S. S. Adams.
Dr. G. W. Cook.
Dr. Sterling Ruffin.
Dr. James D. Morgan.

General Surgery.

Dr. L. H. Taylor.
Dr. G. T. Vaughan.
Dr. W. P. Carr.
Dr. Chas. S. White.
Dr. James F. Mitchell.

Consulting Alienist.

Dr. D. Percy Hickling.

Gynæcology.

Dr. Joseph Taber Johnson.
Dr. J. W. Bovée.
Dr. I. S. Stone.

Ophthalmology.

Dr. D. K. Shute.
Dr. W. K. Butler.

Laryngology.

Dr. C. W. Richardson.
Dr. J. J. Richardson.
Dr. W. A. Wells.
Dr. F. T. Chamberlain.

Medical Zoology.

Dr. C. W. Stiles.
Dr. Thomas A. Claytor.

Dermatology.

Dr. Randolph Bryan Carmichael.
Dr. H. H. Hazen.

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[1] Resigned.

REPORT OF THE ST. ELIZABETHS HOSPITAL.

WASHINGTON, D. C., *July 1, 1918.*

SIR: The board of visitors for St. Elizabeths Hospital have the honor to submit the sixty-third annual report of the hospital, consisting of the report of the superintendent for the fiscal year ended June 30, 1918, and his recommendations.

Respectfully,

WM. C. GORGAS,
President of the Board of Visitors.
WM. A. WHITE, M. D.,
Superintendent, Secretary of the Board Ex Officio.

The SECRETARY OF THE INTERIOR.

REPORT OF THE SUPERINTENDENT.

MOVEMENTS OF POPULATION.

On June 30, 1918, there were remaining in the hospital 3,375 patients, as against 3,244 remaining June 30, 1917, an increase of 151 patients over the previous year. There were admitted during the year 1,054, which is the largest number received in one year in the history of the institution. The total number of patients treated during the year was 4,298. The number of discharges, including deaths, was 923. The daily average population was 3,330 as against 3,209 for the year 1916–17, an increase of 121 patients.

Movement of population, fiscal year ended June 30, 1918.

	Male.		Female.		Total.
	White.	Colored.	White.	Colored.	
Remaining June 30, 1917	1,962	418	545	319	3,244
Admitted during year 1917-18	779	107	113	55	1,054
Total number under treatment during year ending June 30, 1918	2,741	525	658	374	4,298
Discharged:					
Recovered	213	23	32	14	282
Improved	98	16	13	5	132
Unimproved	84	14	19	6	123
Not insane	40	7	5	1	53
Died	198	49	53	33	333
Total discharged and died	633	109	122	59	923
Remaining June 30, 1918	2,108	416	536	315	3,375

ADMINISTRATIVE DEPARTMENT.

Office of Steward.

FARM AND GARDEN PRODUCTS.

Fruits and vegetables raised during the year ended June 30, 1918.

Articles.	Quantity.	Value.	Articles.	Quantity.	Value.
Apples:			Peas:		
Crab........bushels..	100	$100.00	Green........bushels..	7	[illegible]
Green........barrels..	182	452.25	Black-eye........	2	[illegible]
Bean:			Peppers, green......bushels..	253	[illegible]
Lima........bushels..	85	170.17	Pork, fresh........pounds..	19,495	[illegible]
String........barrels..	112	472.35	Plums........bushels..	13	[illegible]
Beets........bunches..	753	23.59	Potatoes:		
Cabbage........barrels..	166	485.43	Irish........bushels..	9,525	[illegible]
Cantaloupes........single..	7,025	351.25	Sweet........do....	464	[illegible]
Carrots........bunches..	10,975	329.25	Pumpkins........single..	5,745	[illegible]
Celery........do....	7,100	355.00	Radishes........bunches..	[illegible]	[illegible]
Cherries........quarts..	460	69.00	Spinach........barrels..	16	[illegible]
Chicken........pounds..	1,198	300.78	Squash, summer......single..	[illegible]	[illegible]
Corn, green........ears..	21,623	216.23	Tomatoes, green.....bushels..	1,930	[illegible]
Cucumbers........single..	6,244	72.44	Turnips........do....	531	[illegible]
Currants........quarts..	80	12.00	Watermelon........single..	1,387	[illegible]
Eggs........dozens..	4,303	1,720.60	Veal........pounds..	101	[illegible]
Eggplant........single..	7,510	375.50	Oysterplant........	6,770	[illegible]
Grapes........pounds..	14,800	444.00	Swiss chard........barrels..	[illegible]	[illegible]
Kale........barrels..	321	404.82	Mushroom........pounds..	17	[illegible]
Lettuce........heads..	25,170	589.80	Cauliflower........do....	[illegible]	[illegible]
Milk........gallons..	155,103	46,834.35	Cauliflower sprouts..barrels..	5	[illegible]
Onions........barrels...	14	28.00			
Onions........bunches..	32,461	973.83	Total........	....	[illegible]
Parsnips........barrels..	47	94.00			
Parsley........bunches..	10,550	316.50			
Pears........bushels..	361	361.75			

Forage and feed raised on farm during year ended June 30, 1918.

Articles.	Quantity.	Value.	Articles.	Quantity.	Value.
Corn:			Hay, green:		
Ear........barrels..	76	$760.00	Cow peas........tons..	104	[illegible]
Shelled........bushels..	310	620.00	Rye........do...	120	[illegible]
Corn fodder........tons..	800	8,000.00	Wheat........do...	110	[illegible]
Hay, green:			Straw, rye........do...	30	[illegible]
Clover and orchard grass........tons..	102	1,020.00	Total........	....	[illegible]

Work of sewing and mending rooms during the year ended June 30, 1918.

ARTICLES MANUFACTURED.

Articles.	Quantity.	Value.	Articles.	Quantity.	Value.
Aprons:			Centerpieces........	1	[illegible]
Boys' gingham........	18	$9.36	Chemise........	1,103	[illegible]
Barber........	4	.86	Cases, pillow........	6,349	[illegible]
Dining room........	118	33.74	Rubber........	9	[illegible]
White........	660	104.30	Covers, screen:		
Gingham........	151	25.93	Brown linen........	3	[illegible]
Bedside canvas........	18	10.08	Sideboard........	23	[illegible]
Bags:			Stand........	[illegible]	[illegible]
Clothes........	10	2.94	Table, brown linen........	3	[illegible]
Jelly........	6	.60	Curtains:		
Blouse........	378	965.25	Sash, cotton........	14	[illegible]
Caps:			Swiss........	16	[illegible]
Nurses'........	8	1.80	Swiss, for disrobing room..	[illegible]	[illegible]
Dairy........	48	7.44	Window........	[illegible]	[illegible]
Rubber........	65	15.37	Rubber........	1	[illegible]
Surgeons'........	3	.60	Cotton........	7	[illegible]

Work of sewing and mending rooms during the year ended June 30, 1918—Continued.

ARTICLES MANUFACTURED—Continued.

Articles.	Quantity.	Value.
Drawers:		
Boys' canton flannel	12	8.16
Canton flannel	2,608	2,084.45
Men's cotton	23	9.88
Women's cotton	843	280.62
Dresses:		
Gingham, light	540	697.00
Gingham, stout	639	996.98
Night, long	358	270.57
Night, short	798	398.00
Percale	578	931.22
Gowns:		
Nurse	29	26.42
Surgeons'	8	10.48
Operating	6	7.86
Towels:		
Barnsley	1,554	319.20
Bath	4,262	597.38
Tea	2,457	636.90
Cases, pillow	2	1.40
Cloth, table:		
Long	259	$791.23
Short	287	544.95
Coats:		
Citizens'	806	1,082.25
Dairy	48	34.56
Overall	648	678.38
Surgeons	7	5.95
Covers:		
Bureau	364	112.58
Car	146	97.30
Couch, brown linen	4	10.24
Corset	14	3.40
Cushion, brown linen	1	45
Pillow B. D.	3	75
Screen	273	73.29

Articles.	Quantity.	Value.
Covers—Continued.		
Cover, book stand, brown linen	2	$4.96
Hose	1,212	114.71
Pants:		
Outing flannel	6	5.28
Boys'	20	5.08
Citizens'	1,581	1,638.46
Dairy	49	35.77
Overall	1,406	1,209.53
Soldiers'	753	1,711.90
Petticoats, outing	1,144	642.24
Sacques, dress	1	79
Sheets:		
Laboratory	1	75
Double	137	104.59
Single	8,394	5,143.90
Shirts:		
Percale	7	4.31
Canton flannel	1,932	1,908.60
Boys' canton flannel	24	13.56
Check	3,393	1,173.94
Night	1,211	768.49
Outing flannel	4	4.68
Skirt, percale	1	73
Strainer, linen	41	19.80
Suits, canvas	12	23.52
Ticks:		
Mattress, double	19	35.76
Mattress, single	738	806.24
Pillow	696	171.49
Tubs, canvas, bath	10	108.20
Underhandkerchiefs	1,023	107.30
Total		30,916.25

REPAIR AND MISCELLANEOUS WORK.

Aprons made	66	$3.96	Names sewed on	10,000	$31.60
Bags, laundry, made	129	5.16	Napkins, patient labor	1,092	43.86
Blankets hemmed	2,622	104.88	Suits cleaned and pressed	111	26.64
Drawers made	10	1.60	Miscellaneous repairs	31,229	1,289.64
Dresses made	6	5.70			
Gloves made	290	11.60	Total		1,524.64

Articles made in the bakery during the year ended June 30, 1918.

Articles.	Quantity.	Value.
Bread ... loaves	1,028,579	$43,218.59
Rolls, single	2,342,872	18,329.66
Pastry ... pounds	57,721	5,775.32
Total		67,323.57

Work done in laundry during the year ended June 30, 1918.

Articles.	Quantity.	Value.
Pieces—		
Washed	3,534,709	$13,475.91
Dried	1,479,491	4,599.11
Mangled	2,055,218	3,404.12
Ironed	360,061	7,299.34
Total		28,778.48

Articles made in Howard Hall workroom during the year ended June 30, 1918.

Brooms	1,021
Brooms, whisk	[illegible]
Hats, straw	[illegible]

Articles made in brush shop during the year ended June 30, 1918.

Brushes:	
Scrub	[illegible]
Sweeping	[illegible]

Work done in mattress shop during the year ended June 30, 1918.

Mats:	
Braided	10
Drawn	114
Mattresses made and made over:	
Hair, single	1,325
Hair, double	32
Straw	13
Hair pillows made and made over	1,161
Hair, old, renovated ... pounds	29,651

Articles made in the shoe shop during the year ended June 30, 1918.

Shoes, men's	228
Slippers, carpet	134

Canned fruits and vegetables, preserves, jellies, etc., prepared in hospital kitchen during the year ended June 30, 1918.

	Quarts.		Quarts.
Apples, canned	42	Cider ... gallons	14
Blackberries	1,326	Cherries, canned	173
Catsup, bottled	2,476	Pears:	
Chili sauce	1,948	Canned	257
Beets, pickled	56	Preserved	1,146
Bean, string	8	Pickled	1,062
Jam, grape	355	Pineapple, canned	47
Jelly:		Plums, preserved	264
Apple	1,545	Onions, pickled	232
Blackberry	67	Strawberries, preserved	151
Currant	9	Tomatoes, preserved	704
Grape	221	Pickled tomatoes	2,508
Peach	7	Watermelon, preserved	17
Grape juice	7	Piccalilli	44
Peaches, canned	11	Sauce, pepper	25

Semipermanent buildings.—Under date of October 6, 1917, Congress in the urgent deficiency act granted authority for the construction and equipment and furnishing of such semipermanent buildings at this institution as might be required to provide additional accommodation for patients, not exceeding $200,000. In carrying out this act a contract was awarded to the Oscawana Building Co., at their bid of $156,700, to be completed in 90 days. The contractor at once proceeded upon the construction of these buildings and the work seems to be progressing very well. These buildings will have the capacity of 504 patients. The dining room will be large enough to take care of all the patients in these buildings and the ward attendants. The kitchen, as built, will be equipped with a capacity for furnishing meals to the patients and attendants in the seven ward buildings and is of sufficient size to enlarge the equipment to feed 1,000 people in case it is found necessary to build additional buildings of the same capacity as that now being constructed.

Shop and storehouse building.—The new shop and storehouse building is being erected to the north of Howard Hall wall. The first floor and basement have been completed, the side walls and window frames for the first floor have been erected, and the steel for the second floor put in place. This building is for the most part being constructed by patient labor, only a very few employees being used. It is of reinforced concrete and will be fireproof throughout.

Coal storage.—The work on track construction and coal-storage space at the power house has been carried on to some extent since the last report. We have completed and put into use 600 feet of track and retaining walls for the hard-coal compartment.' The third track is about 65 per cent complete. This work will be completed as soon as we are relieved of some of the more important work on hand. The delay will not interfere with our service, as we have at present ample storage capacity for coal at the present rate it is being delivered. When this coal track is completed, we will have storage for 6,700 tons of bituminous coal track level and approximately 800 tons of anthracite coal.

New fence.—An iron fence of 5,630 linear feet, together with four double gates with concrete posts and seven single gates, was erected on the east side of Nichols Avenue and along the south boundary of some of the hospital property. The fence was erected by hospital employees supplemented by patient labor. Two hundred and twenty-five feet of the same class of fence that is erected on Nichols Avenue has been purchased to be erected on the north boundary line east of Nichols Avenue to the hospital grounds. This will separate the hospital from its neighbors on the north approach to the hospital, which is now opened to trespassers. Eight hundred feet of fence of a somewhat similar construction and not quite so high was purchased to be erected on the boundary line of the hospital, connecting with the cemetery. The hospital will then have a complete fence for the grounds east of Nichols Avenue, 225 feet on the north boundary, 5,630 feet on the portion of the grounds to the east and facing on Nichols Avenue—all of the ground on the road connecting Nichols Avenue and Alabama Avenue, from the connecting line to the end of the ground bounded by the cemetery.

Ice plant.—The new ice plant has been completed, and the testing out of the new machinery and the old machinery that has been moved has been quite satisfactory. The contractor turned over the plant the first part of April and it has been run by our employees for the last three months.

This plant was moved from an old, dilapidated, dark, hot cellar into a first-class stone building adequately lighted and ventilated. In this new building we have two machines, the old one capable of manufacturing 20 tons of refrigeration, or 10 tons of ice, and the new one rated at 30 tons of refrigeration, or 15 tons of ice. In this same building we have a storage room with a normal capacity of 30 tons of ice that under pressure will hold approximately 50 per cent more, or 45 tons of ice.

Bakery.—Additional machinery has been installed in the bakery, consisting of labor-saving devices with increased capacity for turning out bread. This machinery consists of one flour sifter and conveyor, one flour-storage bin, and 45-gallon water tank, and one 4-pocket scaling machine. The machinery is all run by motor, simplifying and expediting the making of bread, rolls, etc.

Laundry.—Additional machinery has been purchased and placed in the laundry, increasing its capacity and at the same time diminishing the possibilities of danger. The machinery formerly in use was gas machines, and the free flame made it at all times possible that some employee or patient might be burned, aside from the danger from fire. We have replaced this machinery with new steam machines, which not only have greater capacity, are more rapid and simpler, but eliminate all possibility of danger from fire. The work in this department has continued to increase to such an extent that the total number of pieces laundered during the past year amounted to approximately 99,000 pieces more than last year. In addition to this, the hospital washed 180,298 towels for the Interior Department, for which we were reimbursed by that department. We have lost many of the employees of this department and are replacing them as far as possible with patient labor. We have tried patients on our new machines and so far with good results.

Concrete stairway and subway.—The sides of the wall leading to the subway have been used by employees, patients, and their friends to shorten their entrance and exit from the hospital grounds or going from one part of the grounds to another. The need of having some method of getting to the roadway from the subway to the east of Nichols Avenue became so manifest it was decided to build concrete steps leading to this subway, and this has been completed and these steps have been in use for several months.

Safety valves.—New Leonard Rook valves have been installed to control the hot water in B-2 and West Lodge Building baths to minimize the possibility of scalding when bathing patients.

Change in heating system.—The work on the new heating system has not progressed as rapidly as we would like. So far we have removed the old 8-inch steam line at the power house from a point in the pump room running along back of the old battery of boilers to the mouth of the new tunnel, preparatory to putting up a new 12-inch line in its place. We have erected a new 2-inch high-pressure line from the mouth of the old tunnel in the old boiler house to the junction near the old ice plant, to supply steam to heaters and kitchens in the old section; made a connection through the reducing valve through the old 6-inch high-pressure line into the heating system at the junction near the old ice plant, thereby dispensing with about 400 feet of 12-inch low-pressure heating main which has been cut loose, taken apart, and removed from the tunnel. We have threaded and made up the flanges on a number of lengths of 4-inch extra heavy pipe to be used in connection with this job. Specifications are now being prepared to have the balance of the work in connection with the change of the system done by outside contractors. We find it advisable to have the work done in this manner on account of the delay in securing adequate labor.

Wells.—All the wells of the hospital have been practically overhauled and we are securing an adequate supply of good drinking water sufficient for all uses. Permission has been given to both the Army and Navy aviation camp to run a pipe line to these wells to secure a supply of drinking water for the aviation camps which have been constructed on the reclaimed land adjacent to the hospital by the Army and Navy.

Automatic telephones.—The new automatic telephones, consisting of 20 stations, have been installed in the administration building, B and C buildings, and are giving entire satisfaction. We believe it would be wise when money becomes available to extend these telephones to every part of the hospital. The shortage of help in the electrical department delayed the original installation. Until this shortage is provided for, it may not be advisable to have this automatic telephone line extended.

Porches in the Richardson group buildings.—The south porch on I building has been inclosed to use as a smoking or day room for the patients in this building. This permitted the vacating of the day room inside the building and making a thoroughly sanitary, fireproof, well-ventilated room which was formerly an open porch, and besides increased the capacity to take care of additional patients.

Iron guards have been ordered and the lower porches of P building inclosed so that they might be utilized for day rooms. This had the effect of increasing the capacity of P building and at the same time improving the conditions in this building. These guards have been put in place and the patients have enjoyed the additional room and fresh air which has thus been provided for them.

Cows.—The regular tuberculin test of our herd of cattle, including 271 cows, calves, etc., was made and there were 12 reactions and 6 suspects. These reactions were mostly small calves down at Godding Croft. They were all, at once, condemned and disposed of, being slaughtered at the District laboratory under the supervision of the Department of Agriculture experts and the hospital veterinarian, and examination failed to reveal any active symptoms, and only slight lesions on microscopic examination. This gives proof that our herd is well under control. The milk supply continues of the same excellent quality, and increased in quantity over last year. However, there was still a shortage, which was due to the class of help we had in the dairy and our inability to get an adequate class of desirable milking hands. The total quantity of milk received during the past year was 155,103 gallons, an increase of 8,081 gallons.

Pork.—During the year our hogs have not increased as rapidly as we would desire and we are at this time endeavoring to diffuse new blood and strengthen our progeny by the purchase of young sows and boars. During the past year we produced 19,495 pounds of pork.

Poultry.—The conditions in the poultry yard seemed to have improved to some extent and during the past year there were produced 4,303$\frac{5}{12}$ dozens of eggs, and chickens were killed weighing 1,200 pounds. We have a larger number on hand than at the beginning of the year and we expect to get greater results during the coming year.

Industrial departments.—We are continuing our efforts to increase the work of the industrial department of the institution and are gradually adding to the class of industries and increasing number of patients that are to work, which benefits both the patients and the institution. There has been a gradual increase in the number of patients being utilized in all branches of the service in the new industries, in the laundry, on the farm, and outlying departments, and particularly bodies of men that have been tried out under special attendants to look after lawns and gardens, and in the dairy.

Brush shop.—This department is continuing to make most of the brushes used in this institution. We have one paid employee who takes charge of the brush making in connection with other industries, all the other employees being patients. During the year there were 1,020 of various classes of brushes turned into the storeroom.

Mattress shop.—The growth of the institution has materially increased the work of the mattress shop. This department, with one paid employee in charge and several patients makes all the mattresses and pillows that are needed in the institution, renovates the old hair after it has been used, makes over many mattresses and pillows, and is now making the mattresses and pillows that will be used in the semipermanent buildings, where 500 beds will be provided for.

Upholstery.—The upholstery department, with one employee in charge and with the assistance of patients, looks after the upholstering of all furniture in the institution, the making and hanging of all curtains, repairing and regulating of clocks, the keeping in good condition the chapel and amusement hall and the cleaning of all rugs and mattings and other odds and ends of the same sort.

Shoe manufacture.—The same employee has charge of this department as is in charge of brushes, all other employees being patients. During the past year the shoe and harness repair shop, has been consolidated with the shoe manufacturing department, and the amount of work materially increased. There has been some restriction to the amount of work turned out, due to the failure to purchase sufficient amount of leather that could have been utilized. This is due to the scarcity of leather and high price of all materials. During the past year there were made 288 pairs of shoes and 134 pairs of slippers.

Broom making.—The broom making department continued manufacturing of the brooms and whiskbrooms during the past year. There were made and turned into the storeroom 1,501 brooms and 96 whiskbrooms.

Hat making.—The hat-making department, located in the Howard Hall, continues to utilize all the straw that comes around tea chests. During the year, 360 straw hats were made and this was sufficient to furnish all those needed by patients around the grounds.

Stocking making department.—The stocking knitting machines have been continually in use during the past year and the patients have knitted on these machines 1,326 pairs of stockings, which were turned into the storeroom for use by female patients.

Fruit and garden products.—We have received quite a large quantity of fruit and garden products from our farm gardens and orchards during the past year, not only sufficient for immediate use, but from the extra supplies the kitchens were able to can several thousand quarts of fruit, put up 2,496 bottles of catsup, gallon size, and many quarts of various kinds of preserves and pickles. These supplies were put aside for use during the winter months.

Tailor shop and sewing room.—The tailor shop and sewing room practically manufacture all the bed linen and household supplies needed in the institution, most of the women's wearing apparel and practically all the men's wearing apparel. The number of patients used in this department has gradually been increasing, taking the place of paid employees as they leave the institution.

Libraries.—The libraries continue to grow, the increase in the medical library during the past year being 1,272 books, which makes a total of 5,292 volumes in this library. In the circulating library there was an increase of 1,118 new books, making a total of 8,214 books in this library. During the year there were approximately 26,000 books drawn for reading, mostly by patients. There are about 250 books drawn each library day and there are two library days each week.

Fire department.—The chief of the fire department has made regular inspections of every part of the institution grounds during the past year, tested out all fire hydrants and was very careful to note that they all were in good repair, tried out all fire extinguishers and recharged same, held fire drills at least once each month, tested out all fire hose under pressure of 125 pounds, inspected fire escapes, fireproof stairways, basements and attics. During the year additional equipment in material was purchased as follows: one up to date fire truck with ladders, additional fire hose and fire extinguishers.

Burrough's Cottage.—The occupant of what is known as Burrough's Cottage, a building located north of the front center, having died during the preceding year, this property reverted to the United States for the use of the hospital. It has since been renovated and put in first-class shape and is now occupied by married couples, consisting mostly of enlisted men who have been detailed to the hospital and their wives who become ward employees of the institution. The furnishing of rooms for married couples has been an inducement to get additional help for the ward service.

A new legislation for the taking care of the military insane.—In the act of October 6, 1917, Congress enacted legislation, giving authority to the Secretary of War, during the existing emergency, to transfer to the various public hospitals for the care of the insane, patients of every class entitled to treatment in St. Elizabeths Hospital that are admitted on the order of the Secretary of War. This same law authorizes the superintendent of this institution to pay for the care of these patients while they are being treated in other hospitals in the country and thus assist in taking care of the military insane of the enlarged Army.

Interned persons and prisoners of war.—In the act of October 6, 1917, Congress authorized the superintendent to receive in this institution for treatment interned persons and prisoners of war under the jurisdiction of the War Department. Several of the patients who have been interned in the various parts of the country have been received into this institution and confined in the Howard Hall department.

Patients from the Canal Zone.—We are now receiving insane patients from the Canal Zone, whose permanent residence can not be stated and who, under the law in view of such conditions, are entitled to be received and treated in this institution.

Appropriations.—It would seem from the foregoing that our average during the year 1919 will be considerably greater than the past year, and our average ending June 30, 1920, will undoubtedly show a tremendous increase over the present number of people in this institution. While the average during the past year was 3,330, yet we are beginning this year with 3,375—45 more than our daily average for last year. Under ordinary circumstances, we believe it would be safe to figure out a daily average of 4,000 patients for next year. Of these, we expect about 1,700 from the District and 2,300 from other sources; but these are extraordinary times, and there is no safe method in estimating for next year the number that this institution must care for. The increased number of patients from the Army of the United States, with a gross total of over 2,000,000 men, would undoubtedly be over 4,000 patients. Adding to those from the Army those from the Navy, from the Marines, from Public Health Service, criminals, and other sources, you can see how very low it is when we place the average daily number of patients at 4,000. At best, whatever estimate we should make would be barely a guess and must be adjusted from time to time when more patients are received here. The number of patients admitted will depend to some extent upon the capacity of the institution and our power to take care of them. We believe, however, it is safe to estimate, as stated, for 4,000 patients. We must have an increased allowance for the cost per capita, on account of the increase of all classes of supplies and of labor. Many of our supplies that we will purchase for the year 1919 have increased from 50 to 100 per cent from the past year. All supplies show a material increase in cost. Our cost per capita during the past year was approximately 82 cents. We do not believe that we can get along with less than 10 per cent increase, or 90 cents a day during the next year. This would be a very conservative and low amount. At 90 cents a day it would be $328.50 a year for each patient; 4,000 patients, as estimated, at $328.50, would be $1,314,000 that we would require for the year ending 1919 to run the institution. Of this amount we would require, for 1,700 District patients, $558,450; for repairs and improvements, $60,000; for roadways, $5,000; balance for support, $690,550.

We have increased the amount that would be required for repairs, and allowed from $55,000 to $60,000. This is very conservative, considering the increased cost of material and labor and the additional buildings that will have to be kept in repair.

We are asking for the same amount for roadways as we have asked for the past several years—namely, $5,000.

Deputy disbursing agent.—An item should be added to the estimates asking authority to appoint a disbursing agent who shall give bond satisfactory to the Secretary of the Interior, and who shall have the same powers as disbursing agent during his absence, subject to the same conditions and under the same rules and regulations governing said disbursing agent, as incorporated in the act of February 20, 1909.

Authority should be requested to increase the pay of the first assistant physician from $2,500 to $3,000 per annum, and the clinical director's from $2,000 to $2,500 per annum. This is the same estimate as was included in our last year's report, and as the same conditions continue to exist that suggested the estimate at that time we believe that it will be well to request it with the next year's appropriation.

MEDICAL DEPARTMENT.

Training school.—The entrance examination for the training school was held October 6, 1917. Sixty-seven attendants were examined, 49 passing and being admitted to the junior class. Four pupil nurses from other hospitals, after passing the examination, were admitted during the year. Ten having resigned, 14 having been discharged, and 8 having failed in their examinations, 19 pupil nurses remain in the junior class.

At the beginning of the year the senior class consisted of 34 members. Of these 4 have resigned, 4 have been discharged, and 5 have failed in their examinations.

Instruction of the junior class consisted of 28 lectures, 24 hours of recitation, and 28 hours of demonstration, together with their work on the ward throughout the year. The senior class received 32 lectures, 30 hours of recitation, and 26 hours of demonstration, together with a special course in dietetics, 10 hours of individual instruction, supplemented by practical work being given to each member of the class. Six members of the class for six weeks at a time received instruction in the operating room, preparing instruments, dressings, solutions, etc.

Twenty-one members of the senior class received their diplomas at the graduating exercises on June 20, 1918.

Except for a shortage of attendants, which leaves the junior class very small, work is progressing satisfactorily. The shortage on the wards has been relieved in a great share by soldiers and sailors sent here for training, many of whom are doing very good work.

Staff conferences.—During the year 825 cases were presented to conference for consideration.

Staff conferences.

	Male.	Female.	Total.
Discharge	439	99	538
Visit	33	25	58
Parole	105		105
Diagnosis	89	1	90
Opinion	30	4	34
Total	696	129	825
Second presentation	160	20	180
Third presentation	88	10	98
Fourth presentation	22	5	27
Fifth presentation	6	1	7
Sixth presentation	4		4
Seventh presentation	2	1	3
Eighth presentation	2		2
Thirty-ninth presentation	1		1
Total	285	37	322
First presentation	217	44	261
	502	81	583

Contagious diseases.—During the year from July 1, 1917, to June 30, 1918, the following cases of contagious diseases were reported:

Measles, 19 white male employees; 12 white female employees; 9 white male patients; and 1 white female patient.

Diphtheria, 1 white male employee and 1 white male patient.

Rubella, 4 white male employees; 4 white female employees; 1 white male patient; 1 white female patient; and 1 colored female patient.

Scarlet fever, 4 white female employees; 6 white male patients; and 1 colored female patient.

Typhoid fever, 4 white male patients.

Varicella, 1 colored female patient and 2 white female employees.

Variola, 1 white female patient.

During January, February, and March, 1918, a slight epidemic of measles and scarlet fever occurred. The infections were not very severe and were attended by no deaths. During June, 1918, one case of smallpox developed.

Physical diseases, July 1, 1917, to June 30, 1918.

	Male.				Female.				Total
	White.		Colored.		White.		Colored.		
	Patient.	Employee.	Patient.	Employee.	Patient.	Employee.	Patient.	Employee.	
General diseases.									
Alcoholism	2								2
Anemia	1					1			2
Arthritis deformans					1				1
Carcinoma, liver					1				1
Diphtheria	1	1							2
Endometritis, gonorrhea							1		1
Erysipelas	11	1			7	1			20
Goiter, exophthalmic					1				1
Gonorrhea	10						1		11
Influenza	50	66	4	3		1			124
Malaria	9	3	1		9	1	5		28
Measles	11	16			3	11			41
Morphinism	2				1				3
Mumps	1	2				1			4
Parotitis		4							4
Pellagra					5	1			6
Rheumatic fever:									
Acute	7	1		1	3				12
Chronic	4		2		2				8
Rubella	1	4			6	2	1		14
Scarlet fever	6	1			1	4			12
Syphilis	7		2		7		1		17
Tuberculosis:									
Miliary			1				1		2
Pulmonary	6	2			3		4		15
Typhoid fever	4								4
Vaccinia	407	16	158	2	276	20	323	1	1 203
Varicella					3	1			4
Variola					1				1
Diseases of nervous system: Organs of special sense.									
Cerebral:									
Abscess	1								1
Concussion	1								1
Hemorrhage	5				8		4		17
Cerumen impacted	3								3
Conjunctivitis	14	4			7		3		28
Glaucoma	1								1
Hemorrhage, subconjunctival					1				1
Herpes zoster	2		1		1		1		5
Hordeolum	3	3	1		8		2		17
Iritis	1	1				1			3
Keratitis	2	1	1		1				5
Migraine		1	2		4		1		8
Neuralgia	1				1				2
Intercostal	1	2							3
Trifacial							1		1
Ophthalmia	1								1
Otitis:									
Externa	2	1							3
Media	9	1	4		4	1	1		20
Panophthalmia	1								1
Scleral hemorrhage					1				1
Status epilepticus	2								2
Ulcer, corneal	1								1
Diseases of circulatory system.									
Aortic insufficiency	2		2						4
Aortic stenosis			1						1
Arteriosclerosis	1								1
Cardiac decompensation	2								2
Cardiac dilatation			1		1				2
Cardiovascular disease	1								1
Endocarditis	7		2		10	1	3		23
Gangrene, arterior-sclerotic	3								3
Hemorrhage, pulmonary	1								1
Hemorrhoids	5		2		2		3		12
Lymphadenitis					1				1
Mitral insufficiency	3		2		1				6
Mitral stenosis			1						1
Myocarditis, chronic	7		1		2		3		13
Pericarditis	1								1
Phlebitis	1								1
Ulcer, varicose	1								1

Physical diseases, July 1, 1917, to June 30, 1918—Continued.

	Male.				Female.				Total.
	White.		Colored.		White.		Colored.		
	Patient.	Employee.	Patient.	Employee.	Patient.	Employee.	Patient.	Employee.	
Diseases of respiratory system.									
Asthma	1		1		1				3
Bronchitis:									
Acute	41	34	15		56	4	16		166
Chronic	5				1				6
Coryza	16	8	7		19	6			56
Empyema		1							1
Gangrene, pulmonary	2								2
Laryngitis	3				1	2			6
Pleurisy	4	2			1				7
With effusion			1			1			2
Pneumonia:									
Bronchial	5	1	4		1				11
Lobar	10	1	2		3				16
Rhinitis	41	2	4		24	8	7		86
Diseases of digestive system.									
Abscess:									
Alveolar	3					1	2		6
Peritonsillar						1			1
Rectal	1	1							2
Adenitis, cervical						1			1
Appendicitis, acute	1		1		1				3
Cholecystitis	1				1				2
Cholelithiasis					1				1
Enteritis	25	2	2		21	3	6		59
Enterecolitis	74	18	2		9				103
Gastritis	6	2			2	2			12
Gastro-enteritis	21	1			1	3			26
Gingibitis	1	1							2
Hyperchlorhydria					2				2
Pharyngitis	20	7	6		7				40
Prolapse, rectum	1				1				2
Stomatitis	1		1				1		3
Ulcerative	3				1				4
Tonsilitis	39	28	3		36	15	27		148
Ulcer:									
Gastric					1				1
Tooth	1								1
Nonvenereal diseases of genito-urinary system and annexa.									
Abortion						1			1
Cystitis:									
Acute	5	1	1			1			8
Chronic	1								1
Epididimytis	1								1
Metrorrhagia					1				1
Nephritis:									
Acute					1				1
Chronic	15	1	1		6				23
Orchitis	2		1						3
Paraphimosis	1								1
Phimosis	2								2
Prolapse, uterus					1				1
Prostatic hypertrophy			1						1
Prostatis	1								1
Pyelitis	1					2			3
Salpingitis						1			1
Diseases of the skin and cellular tissue.									
Abscess	29	7	10		28	1	2		77
Acne	1				1	1			3
Adentitis, cervical			1						1
Bursitis	2				1				3
Carbuncle	4								4
Cellulitis	10	1			2	1			14
Decubitus	4		7		10	1	2		24
Dermatitis	6	1			4				11
Venenata	3								3
Eczema	3		1						4

Physical diseases, July 1, 1917, to June 30, 1918—Continued.

	Male.				Female.				Total.
	White.		Colored.		White.		Colored.		
	Patient.	Employee.	Patient.	Employee.	Patient.	Employee.	Patient.	Employee.	
Diseases of the skin and cellular tissue—Continued.									
Erthema multiforme	2						1		3
Furunculosis	24	3							27
Gangrene			1		1		1		3
Herpes	1				3				4
Ingrown nail	1	2							3
Lymphadenitis					1				1
Paronychia	2				12				14
Pediculosis	8								8
Psoriasis	1								1
Scabies					1				1
Tinea	2								2
Tinea:									
Circinatia	1	1			1				3
Cruris	5								5
Ulcer	8	1	10				1		20
Urticaria	2		1		2				5
Diseases of bones and organs of locomotion, etc.									
Arthritis					1				1
Mastoiditis						1			1
Muscular rheumatism		2			4		4		10
Scoliosis					1				1
Sinusitis, frontal					1				1
Affections produced by external causes.									
Burns	8	1	11		9		5		34
Decubitus					2				2
Dislocation—shoulder	1	2	1						4
Fracture:									
Clavicle	1								1
Cranium	1								1
Femur	7				5				12
Fibula		1			1				2
Humerus	3				1				4
Mandible	2								2
Metacarpal	2	1							3
Nasal	4								4
Patella	1								1
Phalanx	1								1
Pubes	1								1
Rib	1	1	1						3
Scapula	1								1
Tibia		1			1				2
Ulna	2								2
Frost bite			2						2
Heat prostration						1			1
Myalgia	1				5		2		8
Poisoning, belladonna	1								1
Scalds	1								1
Sprains:									
Ankle	6	2	2		4	1			15
Elbow			1						1
Hip			1				1		2
Knee			1		2				3
Phalanx			3		1				4
Shoulder					2				2
Spine		1	1	1					3
Wrist	3	1	1		1		2		8
Wounds:									
Abraded	35		1		34	1	3		74
Contused	137	8	20	1	69	1	12		248
Incised	35	2	1	1	35	5	12		91
Infected	25	2	10	1	44	2	1		85
Lacerated	89	19	42		4		1		155
Total	1,469	302	372	10	877	115	468	2	3,615

Physical diseases, July 1, 1917, to June 30, 1918—Continued.

	Male.				Female.				Total.
	White.		Colored.		White.		Colored.		
	Patient.	Employee.	Patient.	Employee.	Patient.	Employee.	Patient.	Employee.	
Minor operations.									
Cast applied	4								4
Curettage					1	1			2
Excision, nail	2								2
Incision, drainage	23	1	9		11		1		45
Injection:									
Intraspinous	25								25
Mercurial	6								6
Salvarsan	72				38		37		147
Serum, antistreptococcic	2								2
Serum, antityphoid	3	3							6
Lumbar puncture	164		47		7		10		228
Paracentitis:									
Abdominal	1								1
Scrotal	1								1
Thoracic	1								1
Suturing of wounds	28	7	14	1	14		9		73
Vaccination	1,452	90	329	7	367	158	279	33	2,715
Veni puncture	590		61						651
X-ray photograph	7				1				8
Total	2,381	101	460	8	439	159	336	33	3,917

Clinical report, 1917–18.

	Male.				Female.				Total.
	White.		Colored.		White.		Colored.		
	Patient.	Employee.	Patient.	Employee.	Patient.	Employee.	Patient.	Employee.	
DEATHS.									
Abscess, brain	1								1
Aneurism, aortic ruptured	3								3
Aortic insufficiency	2		6						8
Arteriosclerosis	1				2		1		4
Asphyxia, accidental	1								1
Carcinoma:									
Bladder					1				1
Liver	2				2				4
Stomach	1								1
Tongue					1				1
Uterus							1		1
Cardiac dilatation	1		1						2
Cardoivascular disease					2				2
Cerebral artierosclerosis					2		1		3
Cerebral hemorrhage	9		2		6		1		18
Cerebral syphilis	1		1		1		3		6
Cholangitis							1		1
Cholecystitis							1		1
Cholelithiasis					1				1
Cirrhosis, liver	1								1
Cystitis	2								2
Cystitis, hemorrhagic							1		1
Diabetes	1								1
Endocarditis:									
Acute			1						1
Chronic	4				11		5		20
Enteritis, acute					4		2		6
Entercolitis	3				1				4
Epilepsy	2		1		1				4
Exhaustion:									
Dementia praecox	1								1
Heart							1		1
Nervous	1								1

Clinical report, 1917-18—Continued.

	Male.				Female.				Total.
	White.		Colored.		White.		Colored.		
	Patient.	Employee.	Patient.	Employee.	Patient.	Employee.	Patient.	Employee.	
DEATHS—continued.									
Erysipelas	1								1
Fracture, cranium	1								1
Gangrene							1		1
Gangrene:									
Arterio-sclerotic	1								1
Diabetic					1				1
Pulmonary	1								1
Senile	1								1
General debility					1				1
Hernia, strangulated					1				1
Leptomeningitis, acute			1						1
Malaria, pernicious	1								1
Mitral regurgitation	5		3						8
Myocarditis:									
Acute			2						2
Chronic	29		2		2		2		35
Nephritis, chronic	25		1				1		27
Organic brain disease					3		3		6
Pacchymeningitis, acute	1								1
Paresis	45		18				4		67
Pellagra					3				3
Pericarditis	1								1
Peritonitis			1						1
With perforation of colon	1								1
With perforation of ileum	1								1
Pneumonia:									
Bronchial	6		3		2				11
Hypostatic	2		1						3
Lobar	11		1		1				13
Pulmonary, edema	1								1
Pyelitis, acute	1								1
Pyelonephritis	1								1
Scald	1								1
Septicaemia					1				1
Status epilepticus	3		2		1				6
Suicide, asphyxia (hanging)	3								3
Tuberculosis:									
Miliary			1				2		3
Pulmonary	15		1		2		2		20
Tumor:									
Cerebellar	1								1
Cerebral	1								1
Typhoid fever	1								1
Total	196		49		53		33		331

Operations.—The following surgical operations were performed by the consulting staff.

Major operations performed by the consulting staff.

Amputation of finger	1
Amputation of phalanx	1
Appendectomy	4
Curettage	1
Eneucleation of eye	1
Excision, tumor of testicle	1
Gastrotomy	2
Herniotomy	3
Suturing fractured acromion	1
Wiring fractured patella	1
Total	16

The operations were performed by the following consulting surgeons:

Dr. Adam Kemble	1
Dr. A. H. Kimball	1
Dr. Howard Strine, United States Navy	1
Dr. Louis Taylor	7
Dr. Geo. T. Vaughan	1
Dr. Chas. S. White	5
Total	16

Work of the hydrotherapeutic department.

	Male.		Female.		Total.
	White.	Colored.	White.	Colored.	
Total number of patients treated	1,280	1	580	566	2,427
Total number of treatments given	15,905	34	18,752	15,812	50,503
Average number of patients treated per month	106.6	.08	48.3	47.1	168.9
Average number of treatments per month	1,325.4	2.8	1,562.6	1,317.5	4,208.5

Work of the field officer.

Visits made:	
Female, white	11
Female, colored	9
Total	20

Dr. A. D. Weakley, in charge of the dental department, submits the following report of work done during the year:

Work of dental department during year ended June 30, 1918.

Teeth extracted	879
Treatments	788
Fillings	594
Mouths cleaned	148
New artificial dentures	53
Repaired artificial dentures	27
Fractures of mandible	2
Empyema of antrum	1
Necrosis of superior maxilla	1
Total number of patients treated	1,492

Dr. Arthur H. Kimball, in charge of the eye, ear, nose, and throat department, submits the following report of the work done during the year:

Work of the eye, ear, nose, and throat department during the year ended June 30, 1918.

Number of visits	38
Number of patients	362
Male, white	263
Female, white	48
Male, colored	8
Female, colored	17
Employees	26
Total	362

Examinations and treatments:	
Refraction	182
Other eye conditions	90
Nose and throat	54
Ear	36
Total	362
Operations:	
Major	1
Minor	5
Total	6

REPORT OF THE CLINICAL PSYCHIATRIST.

Cases studied with junior physicians and officers of the medical reserve in training at St. Elizabeths Hospital:	
Dementia praecox types	30
Manic depressive types	15
Paranoid types	9
Mental defectives	10
Infection, exhaustion psychosis	3
Intoxication psychosis	1
Prison psychosis	2
Traumatic psychosis	1
Epilepsy associated with psychoses	2
Paresis	7
Arteriosclerotic dementia	19
Senile dementia	6
Total	105
Cases given special psychotherapeutic attention by Dr. Kempf or Miss Dooley:	
Dementia praecox types	29
Manic depressive types	17
Paranoid types	2
Psychoneuroses	1
Total	49

SCIENTIFIC DEPARTMENT.

Photographic department.—During the year much difficulty has been experienced in getting promptly material for our photographic work, but the photographer has managed to do all the work which has been asked of him and has made the following photographs during the year:

For general administrative purposes	36
For scientific department	6
Photographs of patients for records	843
Total	885

Pathological laboratory.—One hundred and fifty-eight autopsies were performed during the year. During the absence of Dr. Pfeiffer many of these were performed by different members of the staff. No histological examinations have been made and reported during the year.

Clinical pathological work.—During the year many of the Wassermann tests and examinations of cerebrospinal fluid were carried out for the hospital through the courtesy of the Naval Medical School. At the hospital these tests were performed only during three months of the year.

The examinations in clinical pathology which have been carried on and reported for the case records, have been as follows:

Urine	1,181
Sputum	117
Blood cytology	22
Pus	17
Stomach contents	1
Feces	2
Wassermann tests	176
Cerebrospinal fluid	15
Milk	1

Psychological laboratory.—The main work of the psychological laboratory has continued to be that of reeducation. During the year many of the Medical Reserve officers who have been stationed at the hospital have been given opportunities for studying methods and for acquainting themselves with the facts and problems relative to reeducation. At the same time one physician has availed himself of the facilities of the laboratory for the preparation for reeducation Army work. One of the enlisted men was also given training, and at the present time four more have been partially trained and will be available in a short time for this kind of work in connection with nervous and mental cases.

In February arrangements were made to undertake the training of a group of officers and civilians to undertake reeducation work in France, but this unit has not yet been sent to us. It is of interest to note that Dr. J. D. Stout, of the Medical Corps, United States Army, who has received training in the laboratory in past years, has been taken for reeducation work with nervous and mental cases and will have the opportunity of utilizing the training received here in that work.

The report of the work which has been done on the paralyzed cases is being prepared and will be pushed as fast as other duties will permit.

Courses for internes and Medical Reserve officers.—Four groups of Medical Reserve officers have been sent to the hospital for training and with two of these groups internes have taken courses. With the first group of Medical Reserve officers three internes were given special didactic training, and with the third group, one interne. These courses resembled those which have been given in the past, but differed considerably in one particular, namely, in the character of the examination. The usual examination was supplemented by the assignment of five psychiatric and neurological topics to each interne for the purpose of thesis. These theses were graded and the internes were graded in accordance with these grades.

The four groups of medical officers were given courses mainly on psychiatry, but with some reference to neurology. In the first course there were also given additional exercises pertaining to problems of discipline in the Army, which were important for the medical officers to understand. The schedule of the fourth course included besides clinical instruction the following didactic exercises:

Neurological diagnoses	5
Simulation, etc	1
Examination methods	9
Principles of reeducation	1
Manic depressive conditions	4
Dementia praecox, etc	6
Syphilitic psychosis	4
Neuroanatomy serology	6
Hydrotherapy	1

PUBLICATIONS.

White, William A., superintendent:

- (With Dr. S. E. Jelliffe, of New York.) Diseases of the nervous system: A textbook of neurology and psychiatry. Second edition, revised, rewritten, and enlarged. Lea & Febiger, Philadelphia, 1917. p. 938.
- Sterilization of criminals. (Report of Committee F of the Institute of Criminal Law and Criminology: Wm. A. White, chairman.)
- The State hospital and the war. Mental Hygiene, July, 1917, pp. 377-382.
- The Adlerian concept of the neuroses. Journal of Abnormal Psychology, August, 1917, Vol. XII, No. 3, pp. 168-173.
- The mechanism of transference. Presidential address before the American Psychoanalytic Association, Boston, May 23, 1917. Reprinted from the Psychoanalytic Review, October, 1917, Vol. IV, No. 4, pp. 373-381.
- Report of Committee on Mental Hygiene. Dr. Wm. A. White, chairman. American Medico-Psychological Association. American Journal of Insanity, October, 1917, Vol. LXXIV, No. 2, pp. 289-294.
- The significance for psychotherapy of Child's developmental gradients and the dynamic differentiation of the head region. The Psychoanalytic Review, Vol. V, No. 1, January, 1918, pp. 93-103.
- The problem of the individual patient in large hospitals. American Journal of Insanity, January, 1918, Vol. LXXIV, No. 3, pp. 405-407.
- Outlines of psychiatry. Nervous and mental disease monograph, series No. 1, Washington, 1918, p. 319. Sixth edition.
- Principles of mental hygiene. The Macmillan Company. New York, 1917. p. 323.

Franz, Shepherd Ivory, scientific director:

- Psychology and psychiatry. Psychological Bulletin, 1917, vol. 14, pp. 226-229.
- Report of a conference on the reeducation and rehabilitation of maimed and crippled soldiers. Psychological Bulletin, 1917, vol. 14, pp. 229-232.
- Reeducation and rehabilitation of crippled, maimed, and otherwise disabled by war. Journal of American Medical Association, 1917, vol. 69, pp. 63-64.
- The retention of habits by the rat after destruction of the frontal portion of the cerebrum. Psychobiology, 1917, vol. 1, pp. 3-18. (With K. S. Lashley.)
- On cerebral motor control: The recovery from experimentally produced hemiplegia. Psychobiology, 1917, vol. 1, pp. 33-49. (With R. Oden.)
- The effects of cerebral destruction upon habit formation and retention in the albino rat. Psychobiology, 1917, vol. 1, pp. 71-139. (With K. S. Lashley.)

Kempf, Edward J., clinical psychiatrist:

- Charles Darwin—The affective sources of his inspiration and anxiety neuroses. The Psychoanalytic Review, Vol. V, No. 2, pp. 151-192.
- The Psychology of "The Yellow Jacket." The Psychoanalytic Review, vol. 4, No. 4, pp. 393-423.

Lind, John E., senior assistant physician:

- Phylogenetic elements in the psychoses of the Negro. The Psychoanalytic Review, Vol. IV, No. 3, July, 1917, pp. 303-332.
- Constitutional psychopathy and its conflict with social conditions. International Clinics, 27th series, Vol. III, September, 1917, pp. 237-252.
- Vagabondage, Reference Handbook of the Medical Sciences, Vol. VIII, 1917, pp. 406-407.
- Decubitis, Reference Handbook of the Medical Sciences, Vol. VIII, 1917, p. 568.
- Trench diseases, New York Medical Journal, January 12, 1918, pp. 73-75; January 19, 1918, pp. 122-124; February 2, 1918, pp. 217-221; February 9, 1918, pp. 266-268.
- The nursing of nervous and mental patients. The Trained Nurse and Hospital Review, Vol. LX, Nos. 5 and 6, May and June, 1918, pp. 238-240 and 319-321.
- The early diagnosis and treatment of syphilis of the central nervous system. International Clinics, 28th series, Vol. II, June, 1918; abstracted in Washington Medical Annals, May, 1918, pp. 198-202.

Pfeiffer, J. A. F., senior assistant physician:

- A note concerning strains of treponema pallidum obtained from the brains of paretics at autopsy. Proceedings of the Society for Experimental Biology and Medicine, Vol. XIV, No. 1.

Murphy, J. P. H., senior assistant physician:

- The therapeutic use of occupation in the treatment of the insane. International Clinics, vol. 1, 28th series, March, 1918, pp. 139-155.

Silk, Samuel A., senior assistant physician:

The psychical changes observed in pulmonary tuberculosis and its relation to insanity. Medical Record, December 8, 1917.

A plea for the early diagnosis of pulmonary tuberculosis with special reference to sanatorium treatment. New York Medical Journal, September 8, 1917.

Evarts, Arrah B., senior assistant physician:

The ephebic psychosis. American Journal of Insanity, Vol. LXXIV, No. 1, July, 1917, pp. 61–75.

Duval, Leon E., assistant physician:

Studies of some border-line cases among criminals. Medical Record, January 12, 1917, pp. 1–38.

Dooley, Lucille, Ph. D., assistant clinical psychiatrist:

Analysis of a case of manic-depressive psychosis, showing well-marked regressive stages. The Psychoanalytic Review, Vol. V, No. 1, January, 1918, pp. 1–46.

NEEDS OF THE HOSPITAL.

The appropriations recommended for the fiscal year ending June 30, 1920, are as follows:

Support, clothing, and treatment at St. Elizabeths Hospital for the Insane from the Army, Navy, Marine Corps, etc.: The amount required is $1,314,000. Of this amount there will be required to be appropriated in the sundry civil bill, $690,550. This is an increase over the past year of $263,800. A full explanation of how this amount has been arrived at is given in detail in another part of this report. As stated, this amount is a pure guess, depending first upon the cost of materials that will be needed, and second, on the number of patients that will be admitted to this institution. The number of patients that will be admitted to this institution will be probably limited to the capacity of the institution. If it is desired by the War Department and is a part of their program, additional buildings may be constructed and the hospital extended to take in many more patients. The figure upon which we based our estimate is 4,000 patients, of which 1,700 must be charged against the District of Columbia and 2,300 to be appropriated for in the sundry civil bill.

We have asked for an increase of $5,000 in general repairs and improvements due to the increased cost of labor and material and also the additional number of buildings that will have to be taken care of.

Summary of appropriations recommended.

Support	$1,249,000
General repairs and improvements	60,000
Roadways, walks, and gradings	5,000
Total	1,314,000

STAFF CHANGES.

The following resignations took effect during the year: Burgh S. Burnet, medical interne; Vachelle E. Harmon, medical interne; Anita A. Wilson, assistant physician; Daniel G. Sampson, junior assistant physician; Alfred Glascock, senior assistant physician; Ross McC. Chapman, first assistant physician; D. G. O'Neil, assistant physician; Guy E. Calogne, medical interne; Jesse W. Smith, medical interne; Arthur H. Kimball, ophthalmologist; John P. Turner, veterinarian.

The following new appointments were made: Ina L. Moore, medical interne; Lucile Dooley, assistant clinical psychiatrist; Guy E. Calogne, medical interne; Elsa B. Will, medical interne; Herman P. Hyder, medical interne; Elmer B. M. Casey, medical interne; Charles L. Billard, ophthalmologist; C. E. Dornheim, veterinarian.

STATISTICAL TABLES.

Admissions and discharges.

	Male.			Female.			Total.
	White.	Colored.	Total.	White.	Colored.	Total.	
Remaining June 30, 1917:							
Army	854	50	904				904
Navy	320	16	336				336
U. S. Public Health Service	58	5	63				63
Civil life	730	347	1,077	545	319	864	1,941
Total	1,962	418	2,380	545	319	864	3,244
Admitted during the year 1917-18:							
Army	354	22	376	2		2	378
Navy	210	4	214				214
U. S. Public Health Service	30	2	32				32
Civil life	185	79	264	111	55	166	430
Total	779	107	886	113	55	168	1,054
Discharged during the year 1917-18:							
Recovered—							
Army	110	3	113				113
Navy	56	1	57				57
U. S. Public Health Service	8		8				8
Civil life	39	18	57	32	14	46	103
Total	213	22	235	32	14	46	281
Improved—							
Army	37		37				37
Navy	25		25				25
U. S. Public Health Service	3		3				3
Civil life	33	15	48	13	5	18	66
Total	98	15	113	13	5	18	131
Unimproved—							
Army	19		19				19
Navy	13		13				13
U. S. Public Health Service	2		2				2
Civil life	50	14	64	19	6	25	89
Total	84	14	98	19	6	25	[illegible]
Not insane—							
Army	25	4	29				29
Navy	6		6				6
U. S. Public Health Service	1		1				1
Civil life	8	5	13	5	1	6	19
Total	40	9	49	5	1	6	55
Deceased—							
Army	101	3	104				104
Navy	22	2	24				24
U. S. Public Health Service	8		8				8
Civil life	67	44	111	53	33	86	197
Total	198	49	247	53	33	86	333
Remaining June 30, 1918:							
Army	916	62	978				978
Navy	398	17	415				415
U. S. Public Health Service	66	7	73				73
Civil life	728	330	1,068	536	315	851	1,919
Total	2,108	416	2,524	536	315	851	3,375

Admission and discharges classified according to sex for the year ending June 30, 1918, and since the opening of the hospital in 1855.

	Year ending June 30, 1918.			Since opening of the hospital.		
	Male.	Female.	Total.	Male.	Female.	Total.
Admitted	886	168	1,054	19,250	5,665	24,915
Discharged:						
Recovered	284	52	336	6,127	1,457	7,584
Improved	113	18	131	2,624	989	3,613
Unimproved	98	25	123	1,123	437	1,560
Died	247	86	333	6,852	1,931	8,783
Remaining	2,524	851	3,375	......	......	......
Total admissions	......	......	......	19,250	5,665	24,915

Percentage of total admissions, recovered, improved, etc.

	Male.	Female.	Total.
Recovered	31.83	25.72	30.44
Improved	13.63	17.45	14.50
Unimproved	5.84	7.72	6.26
Died	35.59	34.09	35.25
Remaining	13.11	15.02	13.55
Total	100.00	100.00	100.00

Monthly changes of population.

	Admitted.			Discharged.			Died.			Total died and discharged.
	Male.	Female.	Total.	Male.	Female.	Total.	Male.	Female.	Total.	
1917.										
July	41	17	58	33	7	40	13	4	17	57
August	76	17	93	29	12	41	21	8	20	70
September	66	7	73	27	6	33	18	8	26	53
October	67	7	73	32	7	39	33	11	44	83
November	83	16	99	22	11	33	21	4	25	58
December	75	9	84	31	3	34	21	8	29	63
1918.										
January	69	13	82	36	7	43	22	4	26	69
February	55	9	64	29	5	34	21	10	31	65
March	61	12	73	68	6	74	21	8	29	103
April	80	17	97	50	5	55	22	9	31	86
May	80	20	100	50	12	62	20	8	28	30
June	133	25	158	82	19	101	14	4	18	119
Total	886	168	1,054	489	100	589	247	86	333	922

Age of patients who died during the year ended June 30, 1918.

Age.	Male.	Female.	Total.	Age.	Male.	Female.	Total.
8 to 15 years	......	1	1	50 to 60 years	20	16	36
15 to 20 years	4	3	7	60 to 70 years	36	20	56
20 to 25 years	10	6	16	70 to 80 years	57	18	75
25 to 30 years	14	3	17	80 to 90 years	17	8	25
30 to 35 years	16	1	17	Over 100 years	......	1	1
35 to 40 years	33	2	35				
40 to 45 years	22	3	25	Total	247	86	333
45 to 50 years	18	4	22				

Ages of patients admitted during the year ended June 30, 1918.

Age.	Male.	Female.	Total.	Age.	Male.	Female.	Total.
6 to 15 years	1	4	5	50 to 60 years	45	18	63
15 to 20 years	57	3	60	60 to 70 years	27	16	43
20 to 25 years	219	12	231	70 to 80 years	19	2	21
25 to 30 years	224	24	248	80 to 90 years	9	7	16
30 to 35 years	118	12	130	Over 90 years			
35 to 40 years	71	25	96	Unknown	20	1	21
40 to 45 years	56	16	72				
45 to 50 years	31	17	48	Total	897	157	1,054

Civil condition of patients admitted during the year ended June 30, 1918.

	Male.	Female.	Total.
Single	664	59	723
Married	176	60	236
Widowed	28	31	59
Divorced	3		3
Unknown	26	7	33
Total	897	157	1,054

Duration of mental disease of patients who died during the year ended June 30, 1918.

Age.	Male.	Female.	Total.	Age.	Male.	Female.	Total.
Under 1 month	29	9	38	2 years to 4 years	29	10	39
1 to 2 months	6	2	8	4 years to 6 years	12	7	19
2 to 4 months	17	4	21	6 years to 10 years	18	8	26
4 to 6 months	12	4	16	10 years to 15 years	9	5	14
6 to 9 months	15	6	21	15 years to 20 years	11	6	17
9 to 12 months	18	4	22	20 years to 25 years	5	4	9
12 to 18 months	17	3	20	Over 25 years	18	9	27
8 months to 2 years	31	5	36	Total	247	86	333

Ages of patients discharged recovered during the year ended June 30, 1918.

	Male.	Female.	Total.
15 to 20 years	14	4	18
20 to 30 years	125	11	136
30 to 40 years	56	9	65
40 to 50 years	26	14	40
50 to 60 years	12	8	20
60 to 70 years	3		3
Total	236	46	282

Duration of residence in the hospital of those recovered during the year ended June 30, 1918.

	Male.		Female.		Total.
	White.	Colored.	White.	Colored.	
20 to 30 days	2	1	1		4
1 to 2 months	12	3	6	1	22
2 to 3 months	22	1	5	2	30
3 to 4 months	28	2	1	1	32
4 to 6 months	60	2	2	2	66
6 to 9 months	43	4	2	3	52
9 to 12 months	14	1	2	2	19
1 to 2 years	16	6	5	1	28
2 to 4 years	9	1	6	2	18
4 to 6 years	7	2	2		11
Total	213	23	32	14	282

Nativity of patients admitted during the year and since opening of the hospital in 1855.

	During year.	Since 1855.
Native born:		
Alabama	6	90
Arkansas	5	52
Arizona		3
California	9	60
Colorado	1	22
Connecticut	9	153
Dakota	1	17
Delaware	4	49
District of Columbia	118	3,270
Florida	2	29
Georgia	8	177
Illinois	28	365
Indiana	10	341
Indian Territory		19
Idaho	1	4
Iowa	11	100
Kansas	8	79
Kentucky	38	370
Louisiana	5	82
Maine	3	181
Maryland	45	1,830
Massachusetts	22	669
Michigan	15	172
Minnesota	7	49
Mississippi	4	77
Missouri	16	222
Montana		3
Nebraska	5	23
New Hampshire	3	104
New Jersey	18	253
New Mexico	1	6
New York	73	1,530
North Carolina	14	255
Ohio	31	847
Oklahoma	3	10
Oregon	4	10
Pennsylvania	44	1,259
Rhode Island	6	83
South Carolina	10	115
Tennessee	16	235
Texas	22	128
Utah		4
Vermont	3	90
Virginia	21	2,407
Washington	3	3
West Virginia	5	119
Wisconsin	12	1,538
Total	837	17,620
Foreign born:		
Alsace		2
Armenia		4
Austria	20	150
Bahamas		2
Bavaria		17
Belgium	1	10
Bermuda		2
Bulgaria	1	1
Bohemia	1	14
Brazil	1	2
Foreign born—Continued.		
British East Indies		9
British Columbia		2
British Possessions		4
British West Indies	1	16
Buenos Aires		3
Canada	4	197
Cape Verde Islands	1	2
Chile		2
Coast of Africa	1	5
Costa Rica	1	3
Cuba	1	11
Cyprus		1
Denmark	3	63
England	8	463
Ecuador		1
Finland	3	21
France	4	121
Germany	15	1,815
Greece	6	32
Guatemala		1
Holland	1	23
Hungary	4	44
Iceland		1
Ireland	18	2,492
Italy	14	141
Japan		17
Korea		1
Malta		3
Mexico	1	19
New Brunswick		4
Newfoundland		5
New Granada		1
Norway	6	84
Nova Scotia	1	26
Panama		1
Philippine Islands	5	23
Poland	2	41
Portugal	2	11
Prince Edward Island		3
Prussia		42
Porto Rico	1	6
China		6
Roumania	1	9
Russia	20	166
Hawaiian Islands	2	5
Saxony		7
Scotland	1	17
Sicily		3
Spain	2	12
Sweden	4	137
Switzerland	2	90
Turkey	2	12
Venezuela	1	1
Wales		24
West Indies	2	11
At Sea		1
Unascertained	53	730
Total	217	7,295
Grand total	1,054	24,915

Forms of mental disease in patients admitted during the year ending June 30, 1918.

	White male.	Colored male.	White female.	Colored female.	Total.
Dementia precox:					
Catatonic	19	4	2	4	29
Hebephrenic	9	3	6		18
Paranoid	23	3	12	5	43
Unclassified	461	37	22	16	536
Manic-depressive	26	1	20	3	50
Paranoia	1	2	3		6
Defective states:					
Idiocy				1	1
Imbecility	18	5	2	3	28
Constitutional inferior	2				2
Constitutional psychopathy	10	4			14
Organic brain disease:					
Arteriosclerosis	25	11	12	3	51
Syphilis	11	3	1	3	18
General paresis	51	17	1	4	73
Toxic psychosis:					
Pellagra			3		3
Alcohol	16	3	2		21
Morphine			1		1
Senile dementia	29	6	8	5	48
Epileptic psychosis	5		5		10
Prison psychosis	16	1			17
Infection-exhaustion psychosis	1	1	3		5
Undifferentiated	23	2	4	5	34
Confusion			2		2
Depression	3		1		4
Excitement	1				1
Hallucenosis		1			1
Paranoid state	12	1	2	1	16
Psychoneurosis:					
Anxiety state	1				1
Hysteria	1				1
Not insane	15	2	1	2	20
Total	779	107	113	55	1,054

Admissions, discharges, and deaths, with the mean annual mortality and proportion of recoveries, per cent of the discharges, including deaths, for each year since the opening of the hospital.

Year.	Admitted.			Discharged.												Remaining June 30 in each year.			Daily average.			Percentage of recoveries on discharges.			Percentage of deaths on average numbers.			Percentage of deaths on total number.		
				Recovered.			Improved.			Unimproved.			Died.																	
	M.	F.	Total.	M.	F.	Total.	M.	F.	Total.	M.	F.	Total.	M.	F.	Total.	M.	F.	Total.	M.	F.	Total.	M.	F.	Total.	M.	F.	Total.	M.	F.	Total.
1855	26	37	63	....	3	3	....	....	.....	....	....	.....	....	....	.....	26	34	60	19.35	20.65	40.00	.....	100.00	100.00	.....	.....	.....	.....	.....	.....
1855-56	36	11	47	3	2	5	....	....	.....	....	1	1	5	3	8	54	39	93	41.20	37.98	70.18	37.50	33.33	35.71	12.13	7.09	10.10	8.06	6.66	7.48
1856-57	25	27	52	2	4	6	3	1	4	7	3	10	8	8	16	59	50	109	54.55	42.80	97.35	10.00	25.00	16.66	14.66	18.69	16.43	10.13	12.12	11.03
1857-58	29	14	43	13	5	18	1	1	2	2	....	2	7	6	13	65	52	117	57.70	50.31	108.01	56.52	44.66	51.42	12.13	11.92	12.03	7.95	9.37	8.55
1858-59	47	18	65	16	5	21	1	4	5	5	3	8	6	4	10	84	54	138	72.93	56.24	129.17	57.13	31.25	47.73	8.22	7.11	7.74	5.36	5.71	5.49
1859-60	68	24	92	26	7	33	4	3	7	3	2	5	13	5	18	106	61	167	100.68	59.00	159.68	56.52	41.17	52.38	12.91	8.47	11.27	8.55	6.41	7.25
1860-61	64	31	95	42	11	53	5	2	7	2	....	2	12	7	19	109	72	181	109.72	64.81	174.57	68.85	55.55	65.43	10.93	10.80	10.88	7.06	7.61	7.82
1861-62	174	12	186	96	8	104	14	1	15	....	....	.....	26	10	36	147	65	212	123.75	65.74	189.49	70.59	42.10	67.09	21.01	15.21	19.00	9.18	11.90	9.81
1862-63	330	25	355	197	6	203	17	1	18	3	3	6	57	4	61	203	76	279	168.41	72.31	240.72	71.89	42.85	70.45	33.84	5.53	25.34	11.95	4.44	10.76
1863-64	484	25	509	282	6	288	69	1	70	5	....	5	67	8	75	364	86	350	205.73	77.66	283.39	66.66	40.00	65.75	42.56	10.30	26.40	11.75	7.92	9.51
1864-65	478	36	514	315	9	324	110	12	122	11	....	11	139	8	147	167	93	200	277.42	33.81	361.23	54.78	31.03	53.64	50.10	9.54	40.69	18.73	6.55	17.01
1865-66	194	28	222	104	5	109	20	7	27	10	1	11	41	12	53	186	96	282	190.92	90.70	281.62	59.42	20.00	54.50	21.47	13.23	18.82	11.35	9.91	10.99
1866-67	88	21	109	45	7	52	11	3	14	11	1	12	19	14	33	188	92	280	189.06	89.46	279.12	52.32	28.00	46.85	10.02	15.65	11.82	6.93	11.96	8.44
1867-68	120	33	153	49	15	64	6	2	8	5	1	6	22	5	27	226	102	328	221.17	96.44	317.61	59.75	65.22	60.95	9.95	5.18	9.50	7.14	4.00	6.23
1868-69	133	35	168	59	11	70	9	6	15	8	2	10	24	9	33	259	109	368	244.55	108.03	352.58	59.00	39.28	54.69	9.81	8.33	9.35	6.70	6.57	6.65
1869-70	146	36	182	32	8	40	18	8	24	11	3	14	15	3	18	331	123	454	294.69	108.08	402.77	43.24	36.37	41.67	5.09	2.77	4.36	3.71	2.05	3.27
1870-71	161	34	195	50	12	62	21	7	28	4	3	7	33	11	44	384	124	508	354.34	121.66	476.00	46.30	36.36	43.97	9.31	9.04	9.24	6.70	7.00	6.78
1871-72	142	44	186	43	8	51	16	13	29	8	1	9	37	7	44	422	139	561	407.21	131.57	538.78	41.34	27.59	38.34	9.09	5.32	8.16	7.04	4.17	6.34
1872-73	153	51	204	49	15	64	23	5	28	3	5	8	32	13	45	468	152	626	431.03	144.11	575.14	45.40	39.47	44.13	7.42	9.02	7.82	5.56	6.84	5.88
1873-74	192	38	230	67	12	79	22	8	30	6	3	9	39	11	50	526	156	682	492.44	151.36	643.80	50.00	35.29	47.02	7.92	7.27	7.76	5.91	5.79	5.88
1874-75	179	51	230	66	9	75	28	22	50	8	3	11	51	7	58	552	166	718	536.46	164.17	700.63	42.13	21.95	38.66	9.50	4.26	8.27	7.23	3.38	6.36
1875-76	166	47	213	67	17	84	26	10	36	1	....	1	48	18	66	570	168	744	564.78	165.59	730.37	47.18	37.78	45.45	8.49	10.87	9.04	6.68	8.45	7.09
1876-77	147	51	198	66	17	83	27	13	40	2	....	2	45	7	52	583	182	765	587.41	176.30	763.71	47.80	45.94	46.89	7.66	3.96	6.80	6.22	3.19	5.52
1877-78	138	44	182	49	11	60	32	9	41	3	4	7	37	9	46	600	193	793	596.82	184.37	781.19	40.49	33.33	38.96	6.19	4.88	5.88	5.13	5.98	4.35
1878-79	169	53	222	68	24	92	30	7	37	3	1	4	51	12	63	617	202	819	619.10	196.70	815.80	44.73	54.54	46.93	8.23	6.10	7.72	6.63	4.87	6.20
1879-80	181	44	225	38	14	52	23	10	33	....	3	3	46	13	59	691	206	897	655.34	196.63	851.97	35.51	35.00	35.37	7.01	6.61	6.92	5.76	5.28	5.65
1880-81	161	62	223	62	10	72	27	9	36	....	6	6	63	18	81	700	225	925	685.37	111.38	896.78	40.78	23.25	36.92	9.19	8.51	9.03	7.39	6.71	7.23
1881-82	178	69	247	62	21	83	31	8	39	2	5	7	74	27	101	709	233	942	697.10	232.88	929.98	36.69	34.43	36.08	10.61	11.59	10.86	8.44	9.18	8.61
1882-83	201	64	265	76	19	95	33	16	49	....	6	6	46	17	63	755	239	994	729.89	235.27	965.16	49.05	31.03	44.13	6.30	7.22	6.52	5.05	5.72	5.22
1883-84	286	64	347	68	13	81	35	8	43	3	1	4	51	16	67	884	262	1,146	797.21	243.27	1,040.48	42.03	34.21	40.51	6.39	6.57	6.44	4.90	5.33	4.99
1884-85	229	91	320	65	24	89	37	12	49	1	1	2	84	21	105	926	295	1,221	902.41	270.89	1,173.34	34.76	41.37	36.32	9.31	7.75	8.94	7.55	5.95	7.19
1885-86	234	69	303	55	22	77	58	15	73	2	3	5	79	23	102	966	301	1,267	936.39	283.23	1,219.62	28.35	34.92	29.96	8.54	8.12	8.36	6.81	6.32	6.69
1886-87	206	62	268	57	15	72	49	17	66	2	1	3	73	19	92	991	311	1,302	956.07	297.36	1,253.43	31.49	28.48	30.90	7.63	6.38	7.34	6.22	5.23	5.99
1887-88	247	71	318	59	10	69	52	14	66	3	1	4	95	25	120	1,029	332	1,361	1,009.55	315.55	1,325.08	28.23	20.00	26.64	9.41	7.92	9.06	7.67	5.64	7.41
1888-89	213	67	380	50	20	70	27	27	54	5	2	6	86	28	114	1,075	322	1,397	1,049.99	323.83	1,373.82	29.94	25.97	28.69	8.19	8.65	8.30	6.92	7.02	6.90

Admissions, discharges, and deaths, with the mean annual mortality and proportion of recoveries, per cent of the discharges, including deaths, for each year since the opening of the hospital—Continued.

Year.	Admitted.			Discharged.												Remaining June 30 in each year.			Daily average.			Percentage of recoveries on discharges.			Percentage of deaths on average numbers.			Percentage of deaths on total number.		
				Recovered.			Improved.			Unimproved.			Died.																	
	M.	F.	Total.	M.	F.	Total.	M.	F.	Total.	M.	F.	Total.	M.	F.	Total.	M.	F.	Total.	M.	F.	Total.	M.	F.	Total.	M.	F.	Total.	M.	F.	Total.
1889-90	274	71	345	39	6	45	43	6	49	....	3	3	112	28	144	1,115	350	1,055	1,108.57	326.53	1,435.10	20.10	13.95	18.12	10.13	9.59	9.76	8.30	7.48	8.04
1890-91	271	81	352	36	30	66	38	15	53	1	1	2	98	30	128	1,253	355	1,608	1,160.62	344.44	1,505.06	20.81	34.47	26.51	8.44	8.71	8.51	6.87	6.96	0.89
1891-92	233	70	303	56	12	68	69	13	82	8	3	11	121	32	153	1,232	365	1,590	1,226.64	348.65	1,575.29	22.05	20.00	21.66	9.86	9.18	9.71	8.14	7.53	8.01
1892-93	261	84	345	57	10	67	46	23	69	4	1	5	140	41	181	1,246	374	1,620	1,255.56	357.02	1,582.58	23.08	13.33	20.81	11.41	11.48	11.44	9.38	9.13	9.32
1893-94	273	88	361	49	13	62	49	16	65	6	....	6	138	29	167	1,277	404	1,681	1,248.16	369.91	1,618.07	20.24	22.41	20.66	11.31	7.84	10.32	9.08	6.27	8.42
1894-95	293	78	371	68	30	98	40	32	72	1	....	1	143	36	179	1,318	384	1,702	1,280.91	386.16	1,667.07	26.98	30.61	28.00	11.16	9.32	10.73	9.10	7.46	8.72
1895-96	278	92	370	74	15	89	39	14	53	7	1	8	146	41	187	1,330	405	1,735	1,290.08	379.25	1,669.33	27.81	21.12	26.40	11.31	10.81	11.20	9.14	8.61	9.02
1896-97	288	88	377	67	17	84	50	44	94	5	....	5	130	32	162	1,367	400	1,767	1,326.08	383.82	1,709.90	26.58	18.27	24.34	9.80	8.33	9.47	8.02	6.49	7.67
1897-98	347	90	437	84	12	296	30	19	49	8	1	9	167	30	197	1,425	428	1,853	1,388.25	409.75	1,798.00	29.06	19.35	27.35	12.03	7.32	10.96	9.74	6.12	8.94
1898-99	498	105	603	173	16	189	59	29	88	38	10	48	158	35	193	1,495	443	1,938	1,438.33	433.51	1,871.84	40.42	17.77	36.48	10.98	8.07	10.31	8.21	6.56	7.85
1899-1900	434	117	551	118	33	151	55	13	65	8	5	13	152	32	184	1,599	477	2,076	1,594.00	444.54	1,948.54	35.75	39.75	36.56	10.10	7.19	9.44	7.87	5.71	7.39
1900-1901	519	166	655	202	33	235	52	25	77	11	6	17	193	33	226	1,660	516	2,176	1,582.33	483.33	2,066.66	44.10	34.02	42.34	12.19	6.83	10.93	9.11	5.38	8.27
1901-2	532	154	686	209	39	248	78	20	98	9	11	20	137	40	177	1,759	557	2,316	1,675.85	518.16	2,194.01	48.26	34.51	45.42	8.17	7.70	8.06	6.24	5.97	6.18
1902-3	554	180	734	211	50	261	106	25	131	19	6	25	189	69	258	1,782	587	2,369	1,737.58	553.58	2,291.16	39.73	33.33	38.32	10.88	12.47	11.26	8.17	9.36	8.45
1903-4	584	182	766	194	42	236	95	35	130	21	13	34	189	54	245	1,867	625	2,492	1,782.08	577.00	2,360.08	38.87	29.16	36.70	10.60	8.66	10.29	7.98	6.50	7.75
1904-5	493	174	667	151	53	204	101	42	143	12	9	21	181	55	236	1,912	639	2,551	1,848.50	598.00	2,446.50	33.70	33.12	33.55	9.79	9.19	9.64	7.66	6.88	7.47
1905-6	431	180	601	173	60	233	94	33	127	29	13	42	150	52	202	1,887	661	2,548	1,887.50	654.50	2,542.00	38.34	37.34	38.07	7.94	7.95	7.94	6.42	6.34	6.40
1906-7	457	182	619	136	45	181	82	52	134	28	12	40	165	51	216	1,913	683	2,596	1,888.10	671.83	2,569.93	32.60	27.50	31.17	8.68	7.60	8.40	7.09	6.05	6.82
1907-8	472	171	643	123	39	162	80	30	110	28	5	33	156	45	201	1,998	735	2,732	1,965.70	699.00	2,664.70	31.52	32.77	32.40	7.93	6.43	7.54	6.54	5.27	6.20
1908-9	517	174	691	133	60	193	52	30	82	35	7	42	185	70	255	2,110	742	2,852	2,061.00	740.66	2,801.66	31.11	34.13	31.99	8.97	9.46	9.10	7.35	7.70	7.44
1909-10	496	154	650	115	56	171	54	20	74	55	26	81	189	71	260	2,193	723	2,916	2,138.91	734.00	2,872.91	23.00	26.89	24.06	8.87	9.67	9.05	7.25	7.92	7.42
1910-11	443	180	623	165	50	215	47	13	60	96	26	122	212	68	280	2,116	746	2,867	2,143.33	740.67	2,884.00	31.73	31.85	31.76	9.89	9.19	9.70	8.04	7.52	7.91
1911-12	543	190	733	160	51	211	33	19	52	72	30	102	258	74	332	2,136	762	2,898	2,124.43	747.32	2,871.75	30.60	29.31	30.01	12.14	9.96	11.52	9.70	7.90	9.24
1912-13	549	197	746	125	49	174	37	20	27	70	34	104	252	69	321	2,201	787	2,988	2,165.36	785.30	2,950.66	35.34	36.79	35.82	11.64	8.78	10.87	9.38	7.19	8.80
1913-14	572	180	752	115	48	163	42	18	60	99	44	133	250	72	322	2,267	795	3,062	2,231.40	794.00	3,025.40	36.32	43.00	38.20	11.21	9.07	10.64	9.01	7.44	8.61
1914-15	471	185	656	103	30	133	50	23	73	71	28	99	265	72	337	2,249	827	3,076	2,225.00	807.50	3,032.50	23.11	19.60	20.72	11.91	8.92	11.12	9.68	7.35	9.06
1915-16	617	198	815	128	47	175	52	29	81	74	30	104	271	67	338	2,341	852	3,193	2,293.70	829.80	3,123.50	24.38	27.74	25.07	11.82	8.08	10.82	9.49	7.51	8.73
1916-17	668	230	898	170	50	220	61	31	92	72	28	100	326	109	435	2,380	864	3,246	2,351.34	857.66	3,209.00	27.01	22.93	24.80	13.86	12.70	13.56	10.50	10.07	10.63
1917-18	886	168	1,050	284	52	334	113	18	131	98	25	123	247	86	333	2,524	851	3,375	2,474.70	855.30	3,330.00	31.81	25.42	30.55	9.98	10.06	10.00	7.56	8.40	8.14

Fifty-five "not insane," 49 males and 6 females, are included with recovered in 1917-18.

Detailed statement of receipts and expenditures for the fiscal year ended June 30, 1917—Additional.

RECEIPTS.

On hand as stated in last annual report:	
Support, 1917	$82, 589. 82
Buildings and grounds, 1917:	
General repairs and improvements	10, 764. 64
Roadways, grading, and walks	1, 494. 81
New fence	13, 976. 12
Electric elevators	1, 772. 50
Remodeling ice plant, etc	8, 779. 16
Miscellaneous receipts:	
Board of District of Columbia patients	15, 707. 63
Board of Marine Hospital Service patients	3, 403. 93
Board of other patients, sale of stock, etc	18, 261. 90
	156, 750. 51

EXPENDITURES.

Provisions and stores:			
Class 1.	Farinaceous foods	$5, 292. 94	
2.	Meats, fresh	4, 782. 08	
3.	Poultry	202. 50	
4.	Meats, salt and smoked	1, 732. 27	
5.	Fish, fresh	316. 68	
6.	Fish, salt	386. 80	
7.	Vegetables, fresh	451. 50	
8.	Vegetables, canned	188. 59	
9.	Fruits, fresh	786. 44	
10.	Fruits, dried	181. 60	
11.	Dairy products	2, 063. 85	
12.	Groceries, wet	513. 38	
13.	Groceries, dry	5, 852. 60	
14.	Condiments	18. 00	
15.	Laundry supplies	3, 908. 35	
16.	Crockery and china	3, 022. 70	
17.	Cutlery and plated ware	192. 00	
18.	Household supplies	785. 96	
19.	Fuel	20, 613. 90	
			51, 292. 14
Furniture and bedding:			
Class 20.	Furniture	3, 731. 49	
21.	Bedding	2, 662. 64	
22.	Window furniture	55. 12	
23.	Table linen	29. 52	
24.	Sewing-machine supplies	90. 36	
25.	Carpets, etc	4, 455. 57	
			11, 024. 70
Dry goods and clothing:			
Class 26.	Clothing, new	379. 37	
27.	Clothing material	1, 181. 85	
28.	Hosiery	135. 00	
29.	Haberdashery	37. 34	
30.	Shoes and slippers, men's	1, 176. 29	
31.	Shoes and slippers, women's	65. 80	
			2, 975. 65
Medical supplies:			
Class 32.	Medical supplies	1, 173. 97	
33.	Surgical supplies	401. 27	
34.	Laboratory supplies	. 70	
			1, 575. 94

Farm and garden:		
Class 35. Wagons and harness	$19.40	
36. Farm and garden implements	745.45	
37. Lawns, roads, and grounds	11.88	
38. Horticultural supplies	391.10	
39. Stable maintenance	33.00	
40. Farm feed	451.04	
41. Dairy feed	708.00	
42. Poultry feed	42.48	
		$2,402.35
Miscellaneous:		
Class 43. Entertainment of patients	459.05	
44. Supply transportation	7.00	
45. Returning escaped patients	15.00	
46. Messages	259.03	
47. Miscellaneous	1,449.77	
		2,189 85
Books and stationery:		
Class 48. Stationery supplies	3.90	
49. Books	239.44	
50. Periodicals	122.60	
		365.94
Construction:		
Class 51. Engineers' supplies	2,078.07	
52. Electrical supplies	7,186.40	
53. Carpenters' supplies	1,387.08	
54. Painters' supplies	127.47	
		10,779.02
Buildings and grounds:		
Class 55. Pay roll, roadways, grading and walks	20.62	
56. Roadways, grading and walks	1,416.92	
57. Pay roll, repairs and improvements	930.94	
58. Repairs and improvements	9,322.91	
59. New fence	10,432.00	
60. Electric elevators	1,544.99	
61. Remodeling ice plant, etc	8,355.87	
62. Pay roll, ice plant	349.47	
		32,373.72
Salaries and wages:		
Class 63. Officers	3,315.41	
64. Administrative	2,434.06	
65. Ward service	10,009.06	
66. Domestic service	186.93	
67. Kitchen service	2,106.23	
68. Industrial	419.50	
69. Laundry	863.50	
70. Fire department	75.00	
71. Engineers	2,868.00	
72. Carpenters and builders	397.50	
73. Tinners	83.34	
74. Construction	273.95	
75. Painters	350.00	
76. Electricians	451.67	
77. Farm and garden	1,460.01	
78. Stables	484.10	
79. Dairy and cow barns	421.83	
80. Lawns and grounds	411.95	
		26,612.04
Balance in United States Treasury:		
Support, 1917	10,745.65	
General repairs and improvements	510.79	
Transferred to new fence, 1918	3,544.12	
Roadways, grading and walks	57.27	
Electric elevators	227.51	
Remodeling ice plant	73.82	
		15,159.16
		156,750.51

Detailed statement of receipts and expenditures for the fiscal year ended June 30, 1918.

RECEIPTS.

Appropriated for:	
Support, 1918	$300,000.00
District of Columbia patients	456,351.30
Board of Marine Hospital Service patients	11,831.79
Board of other patients	26,232.58
Sale of stock, etc	6,249.21
Buildings and grounds, 1918:	
General repairs and improvements	55,000.00
Roadways, grading, and walks	5,000.00
New fence	3,544.12
Buildings and grounds, continuous:	
Shop and storehouse building	17,792.80
Semipermanent buildings	200,000.00
Increased compensation, 1918	24,367.61
	1,106,369.41

EXPENDITURES.

Provisions and stores:		
Class 1. Farinaceous foods	$69,635.66	
2. Yeast	531.96	
3. Meats, fresh	62,260.00	
4. Poultry	5,266.29	
5. Meats, salt and smoked	31,242.93	
6. Fish, fresh	4,547.17	
7. Fish, salt	7,286.16	
8. Vegetables, fresh	7,183.43	
9. Vegetables, canned	6,261.25	
10. Fruits, fresh	174.14	
11. Fruits, dried	4,993.61	
12. Dairy products	35,387.27	
13. Groceries, wet	7,517.84	
14. Groceries, dry	26,035.59	
15. Condiments	76.60	
16. Laundry supplies	10,244.70	
17. Crockery and china	2,180.08	
18. Tin and iron ware	63.00	
19. Cutlery and plated ware	45.60	
20. Household supplies	2,937.51	
21. Toilet articles	1,313.20	
22. Fuel	76,058.24	
		361,242.23
Furniture and bedding:		
Class 23. Furniture	3,718.93	
24. Bedding	12,864.97	
25. Window furniture	8.50	
26. Table linen	3,129.18	
27. Sewing-machine supplies	2.00	
		19,723.58
Dry goods and clothing:		
Class 28. Clothing, new	6,294.54	
29. Clothing material	12,304.88	
30. Hats, straw	81.90	
31. Hats, felt	388.80	
32. Hosiery	1,085.12	
33. Haberdashery	410.60	
34. Shoes and slippers, men's	6,898.95	
35. Shoes and slippers, women's	1,045.00	
		28,509.79
Medical supplies:		
Class 36. Medical supplies	3,641.60	
37. Surgical supplies	1,366.39	
38. Laboratory supplies	121.97	
		5,129.96

Farm and garden:		
Class 39. Wagons and harness	$541.59	
40. Farm and garden implements	256.58	
41. Horticultural supplies	1,330.49	
42. Stable maintenance	38.00	
43. Farm feed	12,289.50	
44. Dairy feed	34,817.30	
45. Poultry feed	777.68	
		$50,061.14
Miscellaneous:		
Class 46. Entertainment of patients	1,632.95	
47. Return of escaped patients	411.05	
48. Messages	1,217.47	
49. Advertisements	75.52	
50. Miscellaneous	330.65	
51. Transportation of patients	108.67	
		3,776.31
Books and stationery:		
Class 52. Stationery supplies	51.25	
53. Printing	35.90	
54. Books	26.67	
55. Periodicals	83.76	
		197.58
Construction:		
Class 56. Engineers' supplies	2,404.38	
57. Electrical supplies	994.56	
58. Carpenters' supplies	313.49	
59. Tinners' supplies	31.95	
60. Painters' supplies	1,374.13	
		5,118.51
Buildings and grounds:		
Class 61. Pay roll, roadways, grading, and walks	1,113.98	
Increased compensation	55.66	
62. Roadways, grading, and walks	1,273.24	
63. Pay roll, repairs and improvements	28,659.88	
Increased compensation	813.14	
64. General repairs and improvements	19,045.91	
65. Shop and storehouse building	2,250.16	
66. New fence	1,914.84	
67. Pay roll, shop and storehouse	1,814.10	
Increased compensation	56.66	
68. Pay roll, new fence	1,009.77	
Increased compensation	18.71	
69. Semipermanent buildings	6,752.65	
		64,778.70
Salaries and wages:		
Class 70. Officers	35,998.57	
71. Administrative	29,291.58	
72. Ward service	97,020.96	
Increased compensation	21,335.03	
73. Domestic service	2,469.34	
74. Kitchen service	23,585.90	
75. Industrial	4,443.70	
76. Laundry	9,730.27	
77. Fire department	375.00	
78. Engineers	31,135.49	
79. Carpenters and builders	3,730.00	
80. Tinners	583.32	
81. Construction	2,846.40	
82. Painters	2,514.00	
83. Electricians	5,291.01	
84. Farm and garden	17,004.79	
85. Stables	5,808.71	
86. Dairy and cow barns	6,330.37	
87. Lawns and grounds	4,787.40	
		304,281.84

On hand:		
Support	$43,968.97	
Buildings and grounds, 1918—		
General repairs and improvements	7,294.21	
Roadways, grading, and walks	2,612.78	
New fence	619.51	
Buildings and grounds, continuous—		
Shop and storehouse building	13,728.54	
Semipermanent buildings	193,247.35	
Increased compensation, 1918	2,088.41	
		$263,559.77
		1,106,369.41

Summary of expenditures.

Current expenses:	
Salaries and wages	$330,893.88
Clothing	31,485.44
Subsistence	495,736.14
Ordinary repairs	15,897.53
Office, domestic, and outdoor expenses	13,235.58
	887,248.57
Extraordinary expenses:	
Permanent improvements to existing buildings	86,278.85
New buildings	10,873.57
Grand total	984,400.99

The report for this year includes expenditures to June 30, 1918, only. The balance of expenditures will be shown in the supplement in next year's report.

	Male.	Female.	Total.
Patients at beginning of fiscal year	2,380	864	3,244
Patients received during the year	886	168	1,054
Patients discharged and died during the year	742	181	923
Patients remaining at end of fiscal year	2,524	851	3,375
Daily average number of patients	2,475	855	3,330
Average number of officers and employees	415	231	646

REPORT OF THE COLUMBIA INSTITUTION FOR THE DEAF

OFFICERS OF THE INSTITUTION.

Patron.—Woodrow Wilson, President of the United States.

President.—Percival Hall, M. A., Litt. D.

Secretary.—Rev. Ulysses G. B. Pierce.

Treasurer.—George X. McLanahan, Esq.

Directors.—Hon. John F. Shafroth, Senator from Colorado; Hon. John E. Raker, Member of Congress from California; Hon. Stephen G. Porter, Member of Congress from Pennsylvania, representing the Congress of the United States; Edward Miner Gallaudet, Ph. D., LL. D., of Connecticut[1]; Theodore W. Noyes, Esq.; Charles H. Stockton, LL. D.; Judge Martin A. Knapp; Dr. David Jayne Hill, of the District of Columbia; John B. Wight, Esq., of New York; the president, the secretary, and the treasurer of the institution.

FACULTY OF GALLAUDET COLLEGE, 1917–18.

Emeritus president and professor of moral and political science.—Edward Miner Gallaudet, Ph. D., LL. D.[1]

President and professor of applied mathematics and pedagogy.—Percival Hall, M. A., Litt. D.

Vice president and professor of languages.—Edward Allen Fay, M. A., Ph. D., Sc. D., Litt. D.

Professor of English and history.—John Burton Hotchkiss, M. A., Litt. D.

Professor of mathematics and Latin.—Amos G. Draper, M. A., Litt. D.[2]

Professor of natural science.—Charles Russell Ely, M. A., Ph. D.

Professor of English and biology.—Herbert E. Day, M. A.

Professor of mathematics and engineering.—Isaac Allison, E. E.

Assistant professor of Latin and in charge of the college women.—Elizabeth Peet, B. A.

Librarian and instructor in English and mathematics.—Helen Northrop, B. A.

Instructor in Latin and natural science.—Victor O. Skyberg, M. A.

Instructor in mathematics and physical director.—Frederick H. Hughes, M. A.

Instructor in agriculture.—Harley D. Drake, B. A., M. S.

Emeritus instructor in drawing.—Arthur D. Bryant, B. Ph.

Instructor in English and history.—Irving S. Fusfeld, M. A.

Instructor in applied art and drawing.—Charlotte E. Weiss.

Instructor in gymnastics.—Helen Devreaux.

Instructor in printing.—Altamont M. Rogers.

DEPARTMENT OF ARTICULATION AND NORMAL INSTRUCTION, 1917–18.

In charge.—Percival Hall, M. A., Litt. D.

Instructors.—Lyman Steed, M. A.; Annie E. Jameson; Sarah H. Porter, M. A.

Normal students.—Helen Bailey, Mitchell College, North Carolina; Dorothy Long, Council Bluffs High School, Iowa; Miriam Michaels, Fort Smith High School, Arkansas.

FACULTY OF THE KENDALL SCHOOL, 1917–18.

President.—Percival Hall, M. A., Litt. D.

Principal.—Lyman Steed, M. A.

Instructors.—Helen Fay; Musa Marbut, M. A.; Grace D. Ely; Lilly Gwin, B. A.; Elizabeth Thompson.

Instructor in art and manual training.—Margaret Wafter.

Instructor in cooking and sewing.—Agnes Suman.

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[1] Died Sept. 26, 1917.

[2] Died Nov. 3, 1917.

DOMESTIC DEPARTMENT, 1917–18.

Supervisor and disbursing agent.—Louis L. Hooper, M. A.
Attending physician.—Harry H. Donnally, M. D.
Dentist.—J. A. Taylor, D. D. S.
Matron, Gallaudet College.—Mrs. Cora V. Troup.
Girls' matron, Kendall School.—Mrs. Edith Reese[1]; Rose E. Bramble.
Boys' matron, Kendall School.—Mrs. Carrie R. Timberlake.
Boys' supervisor.—Robert Fuller.
Girls' supervisor.—Jennie V. Kennedy[1]; Sallie E. Kneass.
Master of shop.—Norman Herrington.
Gardener.—Edward Mangum.
Farmer.—Harley D. Drake, B. A., M. S.
Chief engineer.—William J. Muir.

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[1] Resigned during the year.

REPORT OF THE COLUMBIA INSTITUTION FOR THE DEAF.

Columbia Institution for the Deaf,
Kendall Green, Washington, D. C., August 27, 1918.

Sir: During the fiscal year July 1, 1917, through June 30, 1918, there were under instruction in the advanced department of the institution, known as Gallaudet College, 61 men and 53 women, a total of 114, representing the District of Columbia and 36 States. This is a decrease of three compared with the preceding year.

In the primary department, known as Kendall School, there were under instruction 25 boys and 28 girls, a total of 53, no change over the preceding year. Of the total in this department, 39 were admitted as beneficiaries of the District of Columbia.

There were admitted to the institution during the fiscal year 27 males and 26 females; discharged 26 males and 26 females.

A list of names of students and pupils who have been under instruction since July 1, 1917, and a list of those admitted for the school year 1918–19, will be found appended to this report.

HEALTH.

The usual standard of good health has prevailed among the students and pupils of the institution during the year.

Inoculation against typhoid fever is required of all new students and pupils.

In spite of increasing prices, the usual supply of wholesome food, carefully prepared, has been furnished to students and pupils, and this has no doubt aided in maintaining a high standard of health. No serious cases of illness have occurred during the year.

CHANGES IN THE CORPS OF OFFICERS AND TEACHERS.

Near the close of the fiscal year Miss Elizabeth Peet gave up her work as teacher in charge of the young women of the collegiate department. Miss Charlotte Weiss was given the position of teacher in charge of college women in addition to her regular work as instructor in applied art.

At the same time Miss Helen Northrop assumed the duties of instructor in gymnastics in addition to her other work.

Mr. Irving S. Fusfeld was granted leave of absence to enter the military service of the United States.

A list of officers for the year 1918–19 will be found appended to this report.

COURSE OF INSTRUCTION.

The course of instruction was changed so as to require from all preparatory students two hours regular work per week in drawing instead of one hour as heretofore.

Applied art was made one of the optional courses for all sophomore and junior women.

A department of printing, equipped with cylinder press, job press, cutter, stitcher, and typesetting machine, was opened with an instructor in charge, and practical work in this line was offered as an optional course to qualified students. Almost all the printing required by the institution was done in this department by the instructor and students.

A special course in the conservation of food was given to young women students.

LECTURES.

The following special lectures have been delivered during the year:

IN THE COLLEGE.

Our Founder	Dr. Fay
The Early Days of the College	Dr. Hotchkiss
Aeronautics and Aviation	Dr. Ely
Tuberculosis; its Cause and Prevention	Prof. Day
Ancient Secrets of Measure—The Pyramid of Gizeh	Prof. Allison
Venice, the Queen of the Adriatic	Miss Peet
The United States Army	Miss Northrop
The Origin and Development of the Domestic Horse	Mr. Skyberg
The Heart of the Near East (Illustrated)	Mr. Hughes
The Care of the Feeble-Minded and Insane	Mr. Fusfeld
George Washington, Farmer	Mr. Drake

IN THE KENDALL SCHOOL.

Over the Top	Mr. Steed
The Wonderful Pitcher	Miss Bailey
Undine	Miss Michaels

FINANCES.

	Receipts.	Expenses.
HOUSEKEEPING DEPARTMENT.		
Salaries	$1.96	$8,461.78
Milk	17.26	24.33
Meat	43.87	4,082.35
Groceries	8.05	4,175.87
Fruit and vegetables	3.33	1,589.44
Dairy produce	8.74	1,517.18
Bread and crackers	2.77	1,478.79
Fish		327.55
Prepared desserts	3.00	489.44
Ice	.35	653.10
Supplies	4.35	1,002.17
Equipment	14.95	883.45
Sundries	2.20	194.81
Board	15.00	
Total	125.83	22,358.26

	Receipts.	Expenses.
ADMINISTRATION AND OFFICE.		
Salaries		$[illegible]
Supplies	$4.89	62.08
Equipment	45.00	97.16
Communication service	76.06	[illegible]
Printing	6.60	[illegible]
Auditing and account books		264.97
Sundries		1.08
Total	132.55	8,192.75
GROUNDS.		
Salaries	.75	3,[illegible]
Supplies		312.44
Equipment		[illegible]
Teaming		162.57
Board and care of horses		12.69

Finances—Continued.

	Receipts.	Expenses.
GROUNDS—continued.		
Sundries	$103.15	$60.00
Total	103.90	4,069.65
LAUNDRY.		
Salaries		1,526.97
Supplies		98.20
Equipment		27.19
Sundries		20.10
Total		1,672.46
FARM.[1]		
Salaries		2,546.65
Feed	48.12	4,908.10
Plants and seeds		207.95
Supplies		403.14
Live stock		119.00
Equipment		165.99
Care of live stock		93.95
Repairs		285.11
Milk	1,405.57	
Fruit and vegetables	24.22	
Poultry and eggs	215.53	
Live stock	692.92	
Sundries	59.92	38.05
Total	2,446.28	8,767.94
GALLAUDET COLLEGE.		
Salaries		22,549.95
Library supplies and equipment		421.04
Laboratory supplies and equipment		70.78
Supplies		171.66
Equipment		770.12
Medical expenses	207.99	836.31
Printing office	792.54	487.77
Sundries	140.35	278.51
Total	1,140.88	25,586.14
NORMAL DEPARTMENT.		
Salaries		945.16
GARAGE.		
Salaries		590.68
Gasoline and oil		387.38
Supplies	2.86	345.41
Equipment	205.00	736.96
Repairs		466.98

	Receipts.	Expenses.
GARAGE—continued.		
Sundries	$4.70	$31.86
Total	212.56	2,559.27
IMPROVEMENTS, RENEWALS, AND REPAIRS.		
Salaries	4.00	5,339.02
Materials and supplies	44.16	3,828.54
Equipment		435.13
Contracts	17.24	1,482.09
Printing plant		7,000.00
Sundries	2.22	1.87
Total	67.62	18,086.65
KENDALL SCHOOL.		
Salaries		9,617.24
Supplies		404.47
Equipment		322.23
Medical expenses		271.04
Sundries	44.85	136.60
Total	44.85	10,751.58
LIGHT, HEAT, AND POWER.		
Salaries		2,129.12
Coal	.37	7,469.24
Gas		1,096.58
Supplies	7.20	120.92
Equipment		139.66
Sundries		107.62
Total	7.57	11,062.14
MISCELLANEOUS.		
Traveling	26.43	499.32
Students' merchandise	631.24	861.19
Presents, subscriptions, and advances		39.09
United States appropriations	103,252.84	
Tuition, Gallaudet College	3,825.00	
Tuition, Kendall School	4,315.00	
Equipment, produce, and junk sold	100.32	
Sundries	146.68	95.06
Total	112,297.51	1,494.66
Grand total	116,579.54	115,538.66
Cash on hand July 1, 1917	946.60	
Cash on hand June 30, 1918		1,987.48
	117,526.14	117,526.14

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[1] In addition, the housekeeping department received produce and the grounds service valued at $5,899.33, as follows: Milk, $3,675.38; meat, $820.61; fruit and vegetables, $370.52; dairy produce, $665.42; teaming, $91.40; board of horses, $276.

Statement of the treasurer for the fiscal year ending June 30, 1918.

GENERAL FUND.

1917.		
July 1.	By balance	$595.81
	By 2 Chesapeake & Potomac Telephone Co. coupons, at $25	50.00
	By 8 Chesapeake & Ohio Ry. Co. coupons, at $22.50	180.00
	By 2 Riggs Realty Co. coupons, at $12.50	25.00
	By 1 United States liberty bond coupon, at $8.95	8.95

1917.			
July 1.	By 2 United States liberty bond coupons, at $10		$20.00
	By 6 months interest to Dec. 31, 1917, on balance in Union Trust Co		7.56
	By 6 months interest to June 30, 1918, on balance in Union Trust Co		8.37
Oct. 18.	To Union Trust Co., subscription to United States liberty bond of 1917	$500.00	
Dec. 31.	To G. X. McLanahan, bookkeeping expenses, treasurer's office, to Dec. 31, 1917	50.00	
1918.			
May 16.	To Union Trust Co., rent of safe deposit box to Apr. 6, 1919	4.00	
	To American Surety Co., of New York, premium on bond of treasurer to Mar. 19, 1919	25.00	
June 30.	To balance	316.69	
		895.69	895.69

MANUAL LABOR FUND.

1917.			
July 1.	By balance		$302.90
	By 8 Southern Ry. Co. coupons, at $25		200.00
	By 2 Chesapeake & Ohio Ry. Co. coupons, at $22.50		45.00
1918.			
June 30.	To balance	$547.90	
		547.90	547.90

MEMORIAL ART FUND.

1917.			
July 1.	By balance		$64.43
	By 5 United States 1898 coupons, at $0.75		3.75
	By 3 Washington Ry. & Elec. Co. coupons, at $10		30.00
1918.			
June 30.	To balance	$98.18	
		98.18	98.18

Summary of balances.

General fund	$316.69
Manual labor fund	547.90
Memorial art fund	98.18
Total	962.77

ESTIMATES FOR THE FISCAL YEAR ENDING JUNE 30, 1920.

The following estimates for the fiscal year to end June 30, 1920, have already been submitted:

For the support of the institution, including salaries and incidental expenses, for books and illustrative apparatus, and for general repairs and improvements, $106,000.

For repairs to the buildings of the institution, including plumbing and steamfitting, and for repairs to pavements within the grounds, $10,000.

For painting and equipping new women's dormitory building and finishing grading and walks adjacent thereto, $7,000.

The sum of $106,000 asked for current expenses is an increase of $8,000 over the sum received for the present fiscal year; $2,000 of this is asked for the support of District of Columbia beneficiaries, and $6,000 for general current expenses. It is believed that this sum will be needed to meet the increased cost of food, material, wages, and supplies required for the service of the institution. The policy of the institution has been to use funds with the utmost care, but not to lower the quality of food, material, and equipment used, to the detriment of the institution, its pupils, and employees. It is to be noted, also, that Congress has provided 25 additional free scholarships in the advanced department of the institution, covering board and tuition, and that, therefore, provision should be gradually made for the increase in the number of beneficiaries in this department by an increase in the sum allowed for current expenses.

For a number of years past $6,000 has been allowed for repairs to the buildings of the institution, including plumbing and steamfitting, and for repairs to pavements within the grounds. At the present price of labor and material, this sum cannot pay for much more than half the repairs it covered one or two years ago. Asphalt roadways of the institution need extensive repairing and widening to meet modern traffic demands. The roadway to the farm is also badly in need of repair. A conservative estimate of the value of the buildings, made by the assessor's office of the District of Columbia, has been fixed at approximately $600,000. Our grounds comprise 103 acres with over a mile of walks and roadways. It is easy to see, therefore, that the estimate of $10,000 for special repairs and improvements is really a very conservative one.

During the present fiscal year the sums appropriated for the erection of the new women's dormitory will have been expended. There will remain the painting of the walls of all rooms in this building, the furnishing of part of the dormitory with bedding and study furniture, and the completion of walks and roadways around the building. The sum of $7,000, it is believed, will finally complete all the work on this splendid fireproof structure which has been most wisely provided for by Congress for the use of the young women and officers of the advanced department.

NEW DORMITORY.

During the month of November, 1917, one wing of the new women's dormitory was near enough completion to warrant its use by a part of the young women of the advanced department. The rest of the young women and their officers were moved in from temporary quarters during the month of January, 1918. While the grading outside of the building and painting and other necessary work inside has not yet been completed, the general arrangement and accommodations of the new building have been found very satisfactory. The fact that the building is thoroughly fireproof, and therefore safe at all times for deaf students, makes the addition of this building one of the most important benefactions of the Government to the institution since its foundation.

EXERCISES OF PRESENTATION DAY.

The fifty-fourth public anniversary of the collegiate department was held in the college chapel on Wednesday, May 1. Dr. Charles Wood, of the Church of the Covenant, offered the opening prayer.

Orations given by members of the graduating class were as follows:

The Japanese Garden, Mabel Irene Pearson, of Iowa.
Art, Trade, or Profession, Guilbert Campbell Braddock, of Colorado.
Ali Baba's Cave, Regina Mary Olson, of Nebraska.

Dr. Robert Patterson, of the class of 1870, president of the Gallaudet College Alumni Association, gave the dedicatory address in connection with the new women's dormitory, Sophia Fowler Hall, named in honor of the mother of Edward Miner Gallaudet, founder of Gallaudet College and president of the institution for over 50 years.

In closing, Dr. Patterson suggested the possibility and desirability of a memorial to Edward Miner Gallaudet in the form of an administration building to be erected by the alumni of the college. At the close of his address, the president was enabled to announce that already a fund of some $5,000 had been pledged toward such a building, $1,000 of which was provided for in a bequest from Dr. Gallaudet himself.

It was also announced that $10,000 from the estate of Dr. Amos G. Draper, of the class of 1872, member of the faculty from his graduation until his death last fall, had been set aside by Mrs. Draper and her children as a permanent fund for the use of the institution, the interest to be devoted to the benefit of retiring members of the faculty and their families.

The honorary degree of master of arts was conferred upon Rev. John Henry Keiser, of the class of 1905, successful minister to the deaf in New York City.

Candidates for degrees were presented by Vice President Fay, Dr. Ely, and President Hall, as follows:

For the degree of master of arts.

Frederick Antonio Moore, B. A., 1915, Gallaudet.
Tom Lewis Anderson, B. A., 1912, Gallaudet.

Normal students.

Helen Bailey, Mitchell College, North Carolina.
Dorothy Long, Council Bluffs High School, Iowa.
Miriam Michaels, Fort Smith High School, Arkansas.

For the degree of bachelor of science.

Wallace Knowles Gibson.
William Ulen Lynch.

For the degree of bachelor of philosophy.

Guilbert Campbell Braddock.
Kenneth Gordon Willman.

For the degree of bachelor of letters.

Henry Stephen Austin.

For the degree of bachelor of arts.

Dorothy Marie Conover.
Ethel Harold.
Florence Eunice Harper.
Philip Alfred Heupel.
Mary Ellen Loveall.
Ethel Monica McAvoy.
Regina Mary Olson.
Mabel Irene Pearson.
Benjamin Marshall Schowe.
Ada Ruth Studt.
Sara Alanson Tredwell.
Effie Anna Weseen.
Caroline Dorothea Wolf.

Dr. David Jayne Hill, of Washington, addressed the graduating class.

The benediction was pronounced by Rev. John Henry Keiser, Episcopal minister to the deaf, New York City.

CONFERRING OF DEGREES.

On the closing day of the term, June 19, 1918, degrees and certificates were conferred in accordance with the recommendations of presentation day, with four exceptions.

Messrs. Guilbert Campbell Braddock and Kenneth Gordon Willman, having made up their deficiences and thus completed all requirements for graduation, were each given the degree of bachelor of arts.

Mr. Henry Stephen Austin, having made up all but one deficiency, was granted the degree of bachelor of philosophy.

Mr. Philip Alfred Heupel, because of his marriage on June 15, 1918, a few days before the close of college, was, according to the rules of the faculty, not allowed to receive his degree.

All of which is respectfully submitted.

Percival Hall, *President.*

The Secretary of the Interior.

APPENDIX A.

CATALOGUE OF STUDENTS AND PUPILS, BY STATES, 1917-18.

IN THE COLLEGE.

- Alabama:
  - Harper, Florence.
- Arkansas:
  - Coats, Dewey.
  - Wallace, Mamie.
- California:
  - Guire, Oscar.
  - Peterson, Lewis.
  - Valiant, Walter.
  - Whitworth, George.
- Colorado:
  - Barnett, Vern.
  - Braddock, Guilbert.
  - Frewing, Robert.
  - Lawver, Esther.
  - Matthew, Gordon.
  - Studt, Ada.
  - Wilson, Powell.
- Connecticut:
  - Bouchard, Joseph.
  - Lewis, Gertrude.
  - Shahinion, Marie.
- District of Columbia:
  - Lynch, Ulen.
  - McAvoy, Monica.
- Florida:
  - Austin, Henry.
- Illinois:
  - Burns, Robey.
  - Eskew, William.
  - Peard, Forrest.
- Indiana:
  - Schowe, Ben M.
- Iowa:
  - Jung, Evelyn.
  - Marty, John.
  - Pearson, Mabel.
  - Rebal, Frank.
  - Waggoner, Mildred.
- Kansas:
  - Atkins, Ruth.
  - Dohrmann, Frank.
  - Ferguson, Gerald.
  - Houze, Clyde.
  - Linton, Pearl.
  - Paxton, Lawrence.
  - Smith, Harley.
  - Stewart, George.
  - Wolverton, Jean.
- Kentucky:
  - Kannapell, Gordon.
  - Tuck, Sara.
- Louisiana:
  - Courrege, Armand.
- Maine:
  - Wadlin, Ernest.
- Maryland:
  - Hetzler, Wroth.
  - Moss, Elizabeth.
  - Winterling, Esther.
- Massachusetts:
  - Cohen, Blume.
- Michigan:
  - Maczkowski, Earl.
- Minnesota:
  - Earsley, Etta.
  - Koenig, Theresa.
  - Lauritsen, Wesley.
  - Post, Eunice.
  - Rosen, Alex.
  - Werner, Maurice.
- Mississippi:
  - Hume, Boyd.
  - McMullan, Frank.
- Missouri:
  - Toner, Isabelle.
  - Wear, Carl.
  - Wolf, Caroline.
- Montana:
  - Cole, Julia.
  - Gibson, Wallace.
- Nebraska:
  - Maxwell, Estella.
  - Olson, Regina.
  - Weseen, Effie.
- New Jersey:
  - Dobbins, Charles.
- New York:
  - Lewis, Gertrude.
  - May, William.
  - Rozboril, Matthew.
  - Tredwell, Sara.
- North Carolina:
  - Calhoun, James.
  - Coltrane, Pearl.
  - Kirby, Ruth.
  - Pike, Hazel.
  - West, Julian.
- North Dakota:
  - Billigmeier, Herbert.
  - Clark, Glen.
  - Francis, Doris.
  - Haley, Wendell.
  - Heupel, Philip.

- Ohio:
  - Bennett, Merritt.
  - Jones, Helen.
  - Pilliod, Norbert.
- Oklahoma:
  - Harold, Ethel.
  - Logan, Mary.
  - McDaniel, Mabel.
  - Wilcoxson, Ella.
- Oregon:
  - Dodd, Julia.
  - Kau, Marguerite.
  - Walker, Clyde.
- Pennsylvania:
  - Davies, George.
  - Flenner, Miriam.
  - Harmon, Edward.
  - Pennell, Mary.
  - Sterck, Emily.
  - Stilwell, Helen.
- South Carolina:
  - Boatwright, Sophie.
  - Hartin, Archie.
  - Pridmore, Carl.
- South Dakota:
  - Hunt, Helen.
  - Sloan, Ollie.
- Tennessee:
  - Osborne, Thomas.
  - Ozier, Claude.
  - Shawl, Arthur.
- Texas:
  - Stevens, Kelly.
- Washington:
  - Deer, Dewey.
  - Loveall, Mary.
  - McNeal, Edwin.
  - Sanders, Oscar.
  - Steuernagel, Letha.
  - Willman, Kenneth.
- West Virginia:
  - Watts, Lula.
- Wisconsin:
  - Conover, Dorothy.
  - Hansmann, Meta.
  - Jensen, Tilla.
  - Kallenbach, Mary.

Total in the college 114

IN THE KENDALL SCHOOL.

- Alberta, Canada:
  - Rosenroll, Richelda.
- Delaware:
  - Ellingsworth, Ida.
  - Lynch, Edward.
  - Roberts, Pearl.
  - Sines, Mabel.
- District of Columbia:
  - Ball, Annie.
  - Berman, Frank.
  - Bostwick, Mabel.
  - Burgess, Archie.
  - Cicchino, Tony.
  - Cissel, William.
  - Cooper, Albin.
  - Covington, Alice.
  - Craven, Jack.
  - Culverwell, Esther.
  - Curtis, Raymond.
  - Dunn, Delma.
  - Higgins, Thelma.
  - Hutchins, Elsie.
  - Looney, Thomas.
  - Miller, John.
  - Miller, Frances.
  - Miller, Mildred.
  - Minter, Leonidas.
  - Moore, Agnes.
  - Moore, Cecil.
  - Furr, Annie.
  - Jones, Mary.
  - Neitzey, Annie.
  - Norcia, Rosie.
  - O'Neill, Virgie.
  - Panholzer, Mary.
  - Pearson, Pearl.
  - Pucci, Luiggi.
  - Reed, Florence.
  - Ridgeway, Earl.
  - Rowzee, Edwin.
  - Scott, Carlisle.
  - Sullivan, Charles.
  - Watts, Azel.
  - Watts, Bryan.
  - Werdig, Robert.
  - Wheeler, Clara.
  - Wuerdemann, John.
- Manitoba, Canada:
  - McShane, Muriel.
  - Nicholson, Ethelwynne.
- South Carolina:
  - Clarkson, Ella.
- Tennessee:
  - Lucado, Prentis.
  - Rittenberg, Sam.
  - Sellers, Andrew.
- West Virginia:
  - MacVeigh, Helen.
  - Schultz, Raymond.
  - Smith, Kathleen.

Total 53

APPENDIX B.

FACULTY AND OFFICERS OF GALLAUDET COLLEGE, 1918–19.

President and professor of applied mathematics and pedagogy.—Percival Hall, M. A., Litt. D.

Vice president and professor of languages.—Edward Allen Fay, M. A., Ph. D., Sc. D., Litt. D.

Professor of English and history.—John Burton Hotchkiss, M. A., Litt. D.

Professor of natural science.—Charles Russell Ely, M. A., Ph. D.

Professor of English and biology.—Herbert E. Day, M. A.

Professor of mathematics and engineering.—Isaac Allison, E. E.

Professor of Latin and English.—Elizabeth Peet, B. A.

Librarian and instructor in mathematics and gymnastics.—Helen Northrop, B. A.

Assistant professor of Latin and natural science.—Victor O. Skyberg, M. A.

Instructor in mathematics and physical director.—Frederick H. Hughes, M. A.

Instructor in agriculture.—Harley D. Drake, B. A., M. S.

Emeritus instructor in drawing.—Arthur D. Bryant, B. Ph.

Instructor in English and history.—Irving S. Fusfeld, M. A.[1]

Instructor in applied art and drawing, and in charge of college women.—Charlotte E. Weiss.

Instructor in printing.—Altamont M. Rogers.

Registrar and Secretary to the President.—Lois I. Herrington.

DEPARTMENT OF ARTICULATION AND NORMAL INSTRUCTION, 1918–19.

In charge.—Percival Hall, M. A., Litt. D.

Instructors.—Sarah Harvey Porter, M. A., Annie E. Jameson, Musa Marbut, M. A.

Normal students.—Ida Gaarder. Iowa State Teachers College, Iowa; Rose Woodward, Morganton High School, Morganton, N. C.

FACULTY AND OFFICERS OF THE KENDALL SCHOOL, 1918–19.

President.—Percival Hall, M. A., Litt. D.

Principal.—Arthur L, Roberts, M. A.

Instructors.—Musa Marbut, M. A., supervising teacher of oral classes; Helen Fay; Grace D. Ely; Margaret Compton; Edith Nelson, M. A.

Instructor in art and manual training.—Margaret Wafter.

Instructor in sewing and cooking.—Agnes E. Suman.

DOMESTIC DEPARTMENT, 1918–19.

Supervisor and disbursing agent.—Louis L. Hooper, M. A.

Attending physician.—Harry H. Donnally, M. D.

Dentist.—

Matron, Gallaudet College.—Mrs. Cora V. Troup.

Girls' matron, Kendall School.—Mrs. Carrie R. Timberlake.

Boys' matron, Kendall School.—Mrs. Arthur L. Roberts.

Girds' supervisor—Virginia Haywood.

Boys' supervisor.—Robert Fuller.

Master of shop.—Norman Herrington.

Gardener.—Edward Mangum.

Farmer.—Harley D. Drake, B. A., M. S.

Chief engineer.—William J. Muir.

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[1] Granted leave of absence to enter United States Army.

STUDENTS AND PUPILS ADMITTED, 1918-19.

IN THE COLLEGE.

- Arizona:
  - Bible, Lenore.
- Colorado:
  - Teitelbaum, Bernhard.
- Connecticut:
  - Baldwin, Clarence.
- District of Columbia:
  - Werdig, Robert.
- Florida:
  - Randall, Laurance.
- Illinois:
  - Cherry, Ladislaw.
- Iowa:
  - Hanson, Harold.
- Kansas:
  - Linton, Pearl.[1]
- Kentucky:
  - Aronovitz, Louis.
  - Kannapell, Robert.
- Manitoba, Canada:
  - McShane, Muriel.
  - Nicholson, Ethelwynne.
- Maryland:
  - Baynes, Harry.
  - Downes, Noah.
  - Leitch, Ruth.
  - Moss, Helen.
- Minnesota:
  - Lindholm, Toivo.
- Mississippi:
  - Breazeale, John.
  - Hume, Boyd.[1]
- Montana:
  - Patrick, Henry.
- Nebraska:
  - Anderson, Edith.
  - Birk, Cecilia.
  - Jensen, Mine.
  - Kilcoyne, Catherine.
  - Tamisiea, James.
- New York:
  - Funk, John.
  - Herdtfelder, August.
  - Higgins, Matthew.
  - Orman, James Nestor.
  - Pusrin, Bella.
- Ohio:
  - La Fountain, Lewis.
  - Pence, Helen.
  - Sattler, Magdalena.
- Oklahoma:
  - Nanney, Nora.
- Pennsylvania:
  - Connor, Fred.
  - Harmon, Marion.
  - Zielinski, Leo.
- South Carolina:
  - Clarkson, Ella.
- South Dakota:
  - Mills, Anson.
  - Sauvage, Esther.
- Tennessee:
  - Lucado, Prentis.
  - Rittenberg, Sam.
- West Virginia:
  - Whitehead, Maurice.
- Wisconsin:
  - Bausch, Anna.
  - Cohen, Jacob.

Total -- 45

IN THE KENDALL SCHOOL.

- Canada:
  - Stinson, Kathleen.
- District of Columbia:
  - Glorius, Frances.
  - Obermiller, Grant.
  - Rodeheaver, Margaret.
  - Stancliffe, Walton.
- Kansas:
  - Lahn, Nathan.
  - Vaughan, Daniel.
- New York:
  - McLaren, Bruce.
- Tennessee:
  - Lucado, Ida May.
- Virginia:
  - Angel, Virginia.
- West Virginia:
  - Gollner, Catherine.

Total -- 11

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[1] Readmitted.

APPENDIX C.

REGULATIONS.

1. The academic year is divided into three terms, the first beginning on the last Thursday in September and closing on the 24th of December; the second beginning the 29th of December and closing the next to the last Friday in March; the third beginning on the following Monday and closing the Wednesday before the last Wednesday in June.

2. The vacation is from the Wednesday before the last Wednesday in June to the last Thursday in September.

3. There are holidays at Thanksgiving, Christmas, Washington's Birthday, Easter, and Decoration Day.

4. Pupils may visit their homes during the regular vacation and on the above-named holidays, but at no other time unless for some special urgent reason, and then only by permission of the president.

5. The bills for the maintenance and tuition of pupils supported by their friends must be paid semiannually in advance.

6. The charge for pay pupils is $400 per annum. This sum covers all expenses in the primary department except clothing and extraordinary medical attention, and all in the college except clothing, books, and extraordinary medical attention.

7. All deaf-mutes of teachable age, of good mental capacity, and properly belonging to the District of Columbia are received without charge. To students from the States and Territories who have not the means of defraying all the expenses of the college course, the board of directors renders such assistance as circumstances seem to require, so far as the means at its disposal will allow.

8. It is expected that the friends of the pupils will provide them with clothing, and it is important that upon entering or returning to the institution they should be supplied with a sufficient amount for an entire year. All clothing should be plainly marked with the owner's name.

9. All letters concerning pupils or applications for admission should be addressed to the president.

10. The institution is open to visitors during term time on Thursdays only, between the hours of 9 a. m. and 3 p. m. Visitors are admitted to chapel service on Sunday afternoons at 3.30 p. m.

APPENDIX D.

REMARKS AT THE DEDICATION OF THE NEW DORMITORY FOR COLLEGE WOMEN.

By President PERCIVAL HALL.

In 1857, the Hon. Amos Kendall gave to the Columbia Institution for the Deaf 3 acres of ground on what is now Florida Avenue near Eighth Street N. E., and a wooden dwelling house in order to establish a school for deaf children in the District of Columbia. In 1859, he caused to be erected at his own expense a substantial brick building, only a few yards from where we are now gathered, as a permanent home for deaf children for whose interest he had worked so devotedly. It may be of interest to know that no contract for the erection of this building was ever made. General plans were submitted to a reputable builder of Washington, and he was asked to name the cost of erecting a first-class brick building of the size indicated. He fixed the sum at $8,000, completed the building, presented the bill to Mr. Kendall, who immediately paid it without question.

This building erected by Mr. Kendall remained, until less than two years ago, as a useful part of the equipment of the Columbia Institution for the Deaf. Before the foundation of the college, it housed Edward Miner Gallaudet, the principal of the institution; his mother, the matron; and the teachers and children under their charge. As the needs of the institution grew, Congress provided liberally for the enlargement of this building, and it was added to until it accommodated all of the pupils of the primary department and, finally, the young women who were admitted to the collegiate department.

With the increase of young women in Gallaudet College, it became more and more evident that a building especially adapted to their needs, safe from the dangers of fire, and conveniently arranged for the housing of young women in small groups, was a pressing need of the institution. This was pointed out to Congress by Dr. Gallaudet before he gave up his management of the institution. Two years ago an appropriation was made to cover the erection of a building of the desired type. Preliminary plans prepared by Prof. Allison, of our faculty, and by the president of the institution, were put in the hands of Supt. Elliott Woods, of the Capitol Building and Grounds, who was placed in charge of the construction of the building by the act of Congress granting the appropriation. Messrs. O. A. Mechlin and F. Chas. Starr, architectural engineers, and Mr. F. L. Pearson, associate architect, prepared the final plans under the direction of Mr. Woods, and the building was begun in the fall of 1916 under the direct supervision of Mr. Gilmore.

No more suitable location for the building could be found than that of the old dormitory. The old building was therefore removed, the young women of the college housed in the homes of the president and the faculty, and the work of the institution was carried on without serious interruption until the new building was nearly enough completed to be used by the young women of the college and their officers.

In spite of the ever-increasing cost of material and the difficulties attending building during the time of war, the construction of the new building has proceeded steadily and successfully under the able direction of Mr. Woods. Congress has met the continually increasing cost of material and labor by adding to the original appropriation enough to complete the building practically as originally designed.

The new building is arranged to accommodate comfortably 6 officers and teachers, 3 domestics, and over 60 students. A small gymnasium, swimming pool, two recitation rooms for the young women, domestic science instruction room, laundry, reading room, dispensary, and hospital rooms are also provided. Comfortable combination living and study rooms, nearly all arranged for two students, each simply but substantially furnished and each containing a separate closet for every student, and a lavatory, make the accommodations all that could be desired. The building is constructed throughout of fire-proof material, the outside walls being of brick, the framework of steel, and the partitions and floors of concrete and tile. Careful consideration has been given to ventilation and light. I believe I may say that the institution has been provided with one of the most comfortable, safe, and durable buildings which could possibly have been designed.

When Edward Miner Gallaudet was called upon to take charge of the Columbia Institution for the Deaf as its first principal, he brought with him as matron for the children under his care his own mother, Sophia Fowler Gallaudet. She herself was deaf and had been one of the first and most brilliant pupils of the parent school at Hartford, founded by her husband, Thomas Hopkins Gallaudet. Her energy and determination reflected in her son, Edward Miner Gallaudet, her successful labors with the deaf children under her care in this institution, and her continued interest in all connected with the college up to the very time of her death, makes it seem most fitting that the new building should bear the name Sophia Fowler Hall.

I now dedicate this new building to the use of the deaf young women who gather at Gallaudet College from all parts of the United States to enjoy the benefits and privileges which Congress has made possible for them here.

APPENDIX E.

AN ADDRESS OF ROBERT PATTERSON AT GALLAUDET COLLEGE ON PRESENTATION DAY, MAY 1, 1918.

Mr. President, Ladies and Gentlemen:

This place on the program is the more acceptable since its intent is to be an honor to the Gallaudet College Alumni Association, rather than to its president personally. And it is appreciated because it offiers a twofold opportunity—first, to speak the mind of our association; and second, to express a closer affiliation with our Alma Mater.

It is not to be inferred, however, that we are lacking in the proper college spirit. That were well-nigh an impossibility after our struggle for the attainment of the higher education, especially since this hall of learning has the distinction of being the only one of its kind in the history of the world; and its work is so filled with glorious results. For are we not always eager to renew association with the life at our college; always aglow over the memory of halcyon days spent within its sphere of influence; and always interested in following its career? What need to point to the wonder and bliss of mental growth during our passing through these great doors of learning; to the stimulus and polish of personal contact with varied ideals of scholarship and of personality; to the inspiration of sighting the lighted way of the world; to the joy of a welcome as efficient workers in the world's program of service; to the zest of keener apprehensions to enjoy the blessings of life in spite of the hampering bounds of the silence which is an inalienable part of our earthly existence? This wide range of benefits is sure to establish in our hearts a gratitude which is not capable of ever deteriorating into indifference toward our Alma Mater, much less into forgetfulness.

We are glad to come into this community of interest this afternoon. It is a privilege again to do honor to our Alma Mater at her shrine. It is a sort of renewal of our youth to get once more into the fine old swing of the chapel procession, and to rejoice with the graduating class in the beautiful ceremony of presentation for academic honors. It was a happy thought which brought the joy and dignity of presentation day as the prelude to the customary commencement. The pleasure of the day is accentuated by the fact that it comes at this time of year when the frost is out of the ground, and dear old Kendall Green is budding forth into blossoms and leaves under blue skies and soft zephyrs. Of no small moment is the efficacy of these gentle influences on the heartstrings, stirring into bloom hope and aspiration, thereby calling forth the perennial discovery of a new world and a new view of life. What more fitting occasion for our Alma Mater to send forth her graduating class into the world's service?

On this presentation day of 1918 something new enters into the familiar emotions. It is the joy of dedicating Sophia Fowler Hall. We gladly join in congratulating President Hall and the board of directors upon this splendid achievement; and the women students upon their good fortune in coming into possession at last of this permanent domicile. The name also is appropriate as it honors the wonderful deaf woman whose inspiring life story is beautifully told by the late lamented Prof. Draper in the American Annals of the Deaf. She was one of the pupils in the first public school for the deaf when it was opened in Hartford in 1817. Although she was then 19 years of age, she had to begin, like a child, with the very first rudiments of an education. But such was her intelligence, courage, industry, and ambition that her progress aroused the wonder and admiration of her teacher, Thomas Hopkins Gallaudet. And it was small wonder that her naive modesty, womanliness, and personal charms so captivated his fancy and heart that their lives so naturally commingled. The happy union brought to her the joy and glory of motherhood; eight fine children—four sons and four daughters—rose up to call her blessed. Of her sons two devoted their lives to the uplift of the deaf, one leading the way for them into church service and missionary work, and the other opening the pathway to higher education. This honored mother developed into the noble Roman matron type, attracting the notice which a striking presence always commands, and drawing about her a circle of friends by the magnetism of her fine personality. Her dignity, wisdom, and influence were felt during her matronship of the Columbia Institution; men of power and influence, because of knowing and admiring her, took an interest in the upbuilding of the institution, especially of its collegiate department. Her death was beautiful and peaceful, coming as it did one Sabbath evening in May, 1877, in her eightieth year while she was kneeling in silent prayer at her bedside in the home of her son, Edward. Such was the woman in whose honor this hall is dedicated. There is magic in her name to open the hearts of the women students to the influence of her beautiful ideal of womanhood; and in cherishing and pursuing it, they will enter into joy—the joy of true womanhood.

In this building is written a fresh evidence of the greatness of our Government, of its continued confidence in the ability of the deaf to pursue higher education, and of its willingness to continue a helping hand that they may have equality of opportunity in higher education with their hearing brethren. This hall, coming as it does amid the stress and strain of the world-struggle, will be a constant reminder of the wonderful fact that our college came into being during the dark days of the Civil War.

What was it that thus brought forth the birth of our Alma Mater? The very spirit which impelled the entry of our country into the present war with the determination that the world shall be made safe for democracy—the spirit which gave impetus to the Declaration of Independence and opened the door to freedom—the spirit which recognized the right of man to education and gave life to the public school and to the State university—in short, the spirit of democracy which is the spirit of justice between man and man, working out human progress.

The spread of this spirit, persistent as it has been, has, however, been slow but nevertheless sure,

"—— through many an age
Of pain, toil, striving, grief and rage."

It had its genesis in the overthrow of the ancient theory of "Might is right." It received a great impulse through the influence of Jean Jacques Rousseau's "Social Contract" (1762) and of Thomas Paine's "Rights of Man" (1791-92). It is now proclaiming to the world the great theme, "The Rights of Nations," as enunciated by President Wilson in his historic address to Congress. It will be next chanting the battle cry of "The Brotherhood of Man," as civilization seems so to decree. And thus it will press on until heaven is brought down to earth.

Who can have more cause to be thankful for the evolution of this spirit than the deaf? In the olden time when the principle prevailed that education was an affair of the individual, only the favored children of the earth walked in the paths of learning and culture. What wonder that the deaf had no chance? The calamity of deafness stood over its victims like a grim jailer by virtue of the dictum of Aristotle (B. C. 384–322) that the ear is "the organ of instruction."

Fortunately for the deaf, this theory was challenged by Girolamo Cardano of Milan (1501-1571) when he advanced the principle that "ideas can be associated directly with writing without the intervention of sound, and so 'the deaf-mute can hear by reading and speak by writing.'" This principle, clear and accurate as we know it to be, was, however, a long time making its way into the domain of realization. It was not put to the test until about 1760 when, simultaneously but independently of one another, and under the sway of different ideals, schools were opened by the Abbé de l'Epée in France, Samuel Heinicke in Germany, and Thomas Braidwood in Great Britain. Then the long dark night which had hung over the deaf ended in a dawn which brought the wonder and joy of a new day into their lives, lightening the burden of a gray existence.

It is but justice to call attention on this occasion to the fact that it was in our great sister republic, France, the star of hope first rose on the free education of the deaf, when De l'Epée chose to let the light shine down upon his work and gladly spread the knowledge of his art. The romance of his unselfish service paved the way for the coming of the public education of the deaf. The French Government, in honor of his memory after his death, established the Royal Institution for the Deaf and Dumb at Paris in 1791. It was in this very same institution that our Thomas Hopkins Gallaudet received the gift of the enchanted rod with which to smite the rock; and the precious stream of education came out abundantly for the deaf of our country.

It is interesting also to recall that in this Paris institution was established in about 1838 "a higher course, with the title of classe d'instruction complementaire," in accordance with the will of Dr. J. M. G. Itard, for many years its physician. Doubtless this had an influence upon the rise of the high class in the American school and the New York institution in 1852. But it remained for America to reach the zenith when this college was founded in 1864, and brought forth this golden era of education for the deaf. For this we can not be too grateful or too happy that it is our good fortune to live in this grand country of ours.

Honor and justice and gratitude call upon us in this time of crisis to pledge anew our loyalty to our country. There is a new world of big thoughts and generous sentiments which is awakening men to a fuller consciousness of duty and sacrifice. To the "Wake up, America" spirit we, too, are responsive, giving our patriotic impulses full play to help our country in its tremendous activities to achieve victory, and not a few of our own sons are "out to win," as Lieut. Coningsby Dawson tersely expresses it. This is no time merely to do our bit, but to do our utmost for our country, so that—

> * * * the Star-Spangled Banner in triumph shall wave
> O'er the land of the free and the home of the brave!

Nor is this all. It is equally fitting that we should renew our pledge of loyalty to our alma mater. There is a tug at our sense of appreciation, calling upon us to give more of our thoughts to her, to meet more adequately her claim on our devotion. to make our loyalty one of deeds, not words alone, and to prove ourselves worthy of our sainted Edward Miner Gallaudet, whose vision, genius, and knight-errantry made possible our participation in the advantages and the honor of our college.

It is likely that, on account of its super burdens of carrying on the war, our Government may not be able to erect another building on Kendall Green for some time to come. There is a pressing need of an administration building. which, by providing for offices, class rooms, library, and halls for use of the various society activities, would release certain rooms for dormitory purposes and thus make possible a larger attendance. We are offered an opportunity to make a gift of such a building to our alma mater as a memorial of our beloved college founder. It would not only be a tangible proof of our appreciation of what the Government has already done for our college but also a visible token of our love and gratitude for the great friend who believed in us. Would it require sacrifices? Certainly. But we would be strengthened and ennobled by them; we would then understand and appreciate something of the sacrifice our friend made in living and working for our benefit. Not until we have done our part can we fully approve ourselves and show ourselves approved to the world.

It is a beautiful thing that we are doing this afternoon in consecrating this hall. Long may it stand as a fitting memorial of the noble deaf mother whose romantic career is linked with all that is best and beautiful in the life and education of the deaf! Shall there not now arise another building on the other side of the campus in memory of the son who fought to a successful issue the battle of higher education for the deaf? Then the two buildings on either side of the statue of the father—how complete would be such a noble trinity of monuments, telling to the world the proud story of the rise and progress of the education of the deaf in America.

Let there be among us a firm spirit of faith, courage, and self-denial; and oh, let neither clouds of doubt nor mists of discord rise to dim the bright hope of success.

APPENDIX F.

ADDRESS OF DR. DAVID JAYNE HILL, GALLAUDET COLLEGE, PRESENTATION DAY, WEDNESDAY, MAY 1, 1918.

President Hall, Members of the Board of Directors and of the Faculty, Ladies, and Gentlemen:

I suppose it is because I have the honor to be the last addition to the board of directors that I have the additional honor of being permitted to address a few words this afternoon to the graduating class.

I feel that I am quite inadequate to the complete expression of the little I have to say in the presence of those who have two methods of communication, when I have only one, and I fear that after the poetry of motion with which we have all been charmed in the beautiful address of Dr. Patterson, the president of the alumni, my simple prose will sound very crude and very dull.

It is now just 20 years since, coming as a resident to Washington, I have known this institution. Among my earliest friends here was its president, Dr. Edward Miner Gallaudet. I come to you with no eulogy upon him, but I can not pass over the opportunity without availing myself of it to express the sincere regard—I may say the reverence—I have entertained for the founder of this institution. As scholar, as citizen, as educator, as patriot, he stood eminent in this community. His interests were most varied. His primary interest, of course, was to form an avenue to the human soul that would reach out into this great universe which we are all permitted to know something of, but whose inmost glories and grander possibilities may be beyond the senses and the ken of all of us. But Dr. Gallaudet, devoted as he was to the instruction of his students, had other interests very wide and very diversified. Among them, I recall, was his devotion to a subject which it seems to me has met with a great misfortune in the world—international law. Descended from an ancestry that had its origin in the Swiss Republic, and coming to the United States, where he was born in this land of liberty, how could it be otherwise? Then, looking out upon the strife of nations, he felt that there must come a time when justice and right would prevail among the nations, as in these Republics they have already been brought to prevail among individual citizens.

His monument is here, but not all of his monument. However much in the future this institution grows, however many beautiful buildings you may have upon this lovely campus, however fine may be the specific monument of which the president has spoken to you, and with which you are going to honor yourselves, I hope, as well as the memory of Dr. Gallaudet, there will be upon this earth a monument grander than that altogether. All over this land, in every State of the Union there are men and women, fountains of influence going out and never ceasing going out for all time, and these are a part of that great invisible monument to Dr. Edward Miner Gallaudet.

And now, my young friends of the graduating class, what is the lesson of this life, this life of toil, of devotion, of industry, of sacrifice? If I were to try to put it into one single expression I think I could find no better than this—the dignity of human service. And I say the dignity of human service because my thought is not bounded by such a limitation as the utility of human service. Everyone who has ever had anything done for him appreciates the utility of human service because he is its beneficiary. But there is another side to it, and to my mind it is the great side—the dignity of human service. It is living power in the life of the man or the woman who, with consecration of spirit and earnestness and sacrifice renders human service, be it small, or be it great. It widens knowledge, it interests us in things that otherwise would never interest us. Without it we should live in the little narrow circle of our sensations, seeking our pleasures, seeking a life of amusement and of self-entertainment. With it we are brought to understand life. We look out upon the great world to know by what instruments, by what added powers, and in what new forms we may serve in the broadening of the sympathies until we rise from association with our family and our community and our Nation to the wider interests of the world. These dignify human life. These tend to make us as great as our inherited powers and our best endeavors can make us. And so I say I think the lesson of this life is the dignity of human service, and this has an ever-widening circle.

I was much interested in what the speaker said with regard to the beginning of this institution as a family, Dr. Gallaudet and his dear old mother, his deaf mother. How he loved her! How she loved him! And how they loved to help and serve each other! And that spark, that service between son and mother, between mother and son, went out to a wider relationship. Amidst the agonies and the confusion of civil war this institution was born, and it was a very small thing. I think I have heard that at the beginning there was one teacher—that was Dr. Gallaudet—and seven students, just a little family. All the great things in the world have risen from families. Christianity itself, all that is great, all that is good, all that is potent in our lives has begun somewhere. But it is the essence of the spirit of service that is the important thing.

Suppose there had been no such feeling in this family circle. Well, there never would have been a school. And my young friends, it is very natural for you, even with all the pride you entertain of having completed your course of study, and looking forward to graduation and diplomas, to think very modestly of your powers. You are very likely to say to yourself, "But what can I ever do to serve. I am just one little human atom." You do not know, Dr. Gallaudet did not know, his dear old mother had no thought, of what they were growing into and what would grow out of their endeavor. The important thing, therefore, is to start with the spirit because the opportunity always comes. It always comes.

What an opportunity there is for us all now. What an opportunity this war has created for human service on the part of every one of us. There are millions of women in this country whose busy hands have been working, even when we were in that cold, unsympathetic, I might almost say inhuman attitude of neutrality, with small nations crushed, with women and children sacrificed by a ruthless power engaged upon a predatory enterprise, and we were disposed, because we did not understand it—let us say in all charity—we were disposed to say, " It is no affair of ours." Now this war has come and is running through us like a red-hot plowshare, and we feel that there is nothing human that is foreign to us. And when our brave boys are over there, some of them dying at this moment, perhaps, in the trenches, we think of them. They have thought of others. We are all thinking of others. The opportunity is great.

I was very much attracted by a sentence in the oration of the young lady who spoke first this afternoon about the Japanese garden when she spoke of the artist's flower being nothing but a stalk and a petal until the wind stirred it to life. Good Christian people, we were all but pretty stalks and petals until the wind stirred us to life.

There is one important reflection which I will add with regard to the spirit of service that has been stirred up among us as it never was before, and that is that this conception changes the perspective of human history. I do not believe it will ever be possible for us to write history or read it or study it quite in the spirit that our fathers did. We shan't have much interest in who built the pyramids, we shan't have much interest in who built the walls of Babylon, or what king succeeded in dethroning another king and starting a new dynasty. When we become interested in the great onward march of human endeavor in the world, our question will be, our interest will require an answer to that question, " Who has done the things that are moving the world forward?" And in that day the history that will be taught in our schools and the history that will quicken the minds and the hearts of future generations will not be found in genealogical tables, nor in maps of political geography, nor in any of those things. That will be found in the record of human progress and who has made it, and in that day the Gallaudets and the Bells, and people of that kind who have done something to improve human conditions, to make the world an easier place to live in, will have their place as the great characters of history.

I say this with some of the sense of responsibility of a student of history. I say it because it comes over me with great force that the interest of mankind is going to be quickened by what has happened in the last three or four years on this planet and sent speeding forward in a new direction.

Now, my young friends, at this late hour you do not expect me, you do not want me to lecture you. I would like to leave you with just this thought, that the line of growth for you is not along the line of gradual acquisition of technical knowledge to gratify your curiosity, not along the line of immediate palpable gain that can be counted in a bank book, but that growth of mind and heart and spirit that will fit you, that will fit us all, for the opportunities of human service, whether great or small, that may come to us. [Applause.]

APPENDIX G.

ANNOUNCEMENTS.

By PRESIDENT HALL.

Since we met in this hall a year ago, two of our oldest and most distinguished friends have been called away.

Dr. Edward Miner Gallaudet, first principal of the Columbia Institution for the Deaf, founder of Gallaudet College and its president from its foundation in 1864 until his retirement in 1910, died at his home in Hartford, Conn., on September 26, 1917.

To recount his services for this institution would be to tell practically its whole history. To give any adequate idea of his work for the deaf people of the United States would be a difficult task. For many years he stood as the foremost educator of the deaf in the world.

While his services to our college can never be forgotten, and his influence upon the education of the deaf throughout the world can not be recounted, it is perhaps, after all, in the hearts of his students, their children, and their children's children, that his memory will be most lovingly cherished. In 1907 the alumni of the college, as a testimonial of their love and affection, began the accumulation of a fund to be known as the Edward Miner Gallaudet memorial fund. With part of this fund the portrait which hangs upon this chapel wall was purchased during his lifetime.

Since his death a movement has been started to place upon the grounds of this institution a suitable memorial building. Dr. Gallaudet himself has bequeathed to the memorial fund the sum of $1,000. The alumni have already given in cash and pledges enough to make a total of approximately $7,000 toward this object, and in time it is hoped that an Edward Miner Gallaudet Memorial Hall will stand on Kendall Green as a fitting monument to the inestimable work done by Edward Miner Gallaudet for the deaf of this country and of the world.

The other good friend who left us on November 3, 1917, was Dr. Amos G. Draper. Dr. Draper entered Gallaudet College in 1868, graduated in 1872, was immediately given an appointment as tutor, later as instructor and professor, and spent all of the remainder of his life as a member of the faculty of Gallaudet College.

Dr. Draper was one of the best known and most loved of the alumni. He was a writer of clearness and note on matters connected with the education of the deaf. He held positions of high honor among the association of the deaf, and was sent to represent the American deaf at the World's Congress of the Deaf at Paris in 1889. He was also chosen treasurer of the Garfield memorial fund, and was highly instrumental in the successful erection of the statue to Thomas

Hopkins Gallaudet, by Daniel French, which stands before the main entrance of this building.

On April 29 I received from Mrs. Amos G. Draper a letter from which I quote the following paragraphs:

> We are anxious to have some memorial to Dr. Draper that will at the same time be of benefit to the institution where he worked so long and in whose welfare he was so greatly interested.
>
> Knowing how greatly he appreciated the action of the board of directors when he sent in his resignation two years ago, it seemed to us that something of that nature would be the best way to expend the memorial. I am therefore empowered by them to notify you that we have decided to set aside $10,000 as a trust fund to be kept intact, and the interest to be expended by the board of directors for the benefit of one or more members of the faculty as it becomes necessary for such to retire.
>
> We hope that this may be the incentive to others to make similar bequests of greater or smaller amounts; and that the day is not far distant when the institution will have an endowment of at least half a million upon which to draw for its advancement.

The gift of this fund to our institution is most inspiring. As Dr. Draper's whole life and interest were given to our college and its students, his family in making this bequest will keep forever in the minds of the newer generations the love and affection which he always held for Gallaudet College.

REPORT OF THE FREEDMEN'S HOSPITAL.

ROSTER OF OFFICERS.

STAFF.

W. A. Warfield, M. D., *Surgeon in Chief.*
S. L. Carson, M. D., *Assistant Surgeon.*
C. A. Brooks, M. D., *Resident Physician.*
B. Price Hurst, M. D., Pathologist.
N. W. Harris, M. D., *Anæsthetist.*

NURSES.

Laura R. MacHale, Registered Nurse, New Jersey, *Superintendent.*
Emma M. Irwin, Registered Nurse, Illinois, *Assistant Superintendent.*
Martha E. Cabaniss, Registered Nurse, Virginia, *Night Supervisor.*
Lulu E. Thompson, Head Nurse.
Louise V. Marsh, Head Nurse.
Bertha J. Thomas, Head Nurse.

CLERK AND ASSISTANTS.

F. D. Henry, U. S. Garnes (stenographer), W. E. Cobb.

INTERNES.

E. A. Calaway, M. D.
W. W. Cooper, M. D.
H. S. Palmer, M. D.
E. W. Richie, M. D.
E. C. Terry, M. D.
E. C. Wiggins, M. D.
William E. Davis, *Pharmacist.*
A. R. Burton, M. D.
D. H. Carroll, M. D.
J. C. Gibbs, M. D.
W. R. R. Granger, jr., M. D.
J. M. Keaton, M. D.
Oscar N. Smith, *Assistant Pharmacist.*

ADVISORY VISITING STAFF.

Edward A. Balloch, M. D.
Edward D. Williston, M. D.
J. E. H. Taylor, M. D.
Wm. F. Sowers, M. D.
Wm. A. Jack, M. D.
Jas. J. Richardson, M. D.
J. B. Nichols, M. D.

VISITING STAFF.

INDOOR.

Medical.

Henry P. Parker, M. D.
Caryl Burbank, M. D.
Thomas Martin, M. D.
Robert W. Brown, M. D.
J. B. Nichols, M. D.
E. H. Reede, M. D.
Lewis Ecker, M. D.
Assistant: E. J. Watson, M. D.

Surgical.

E. A. Balloch, M. D.
Wm. F. Sowers, M. D.
Wm. A. Jack, M. D.
H. H. Kerr, M. D.
A. M. Curtis, M. D.

Assistants: P. M. Murray, M. D.; J. E. H. Taylor, M. D.; A. L. Curtis, M. D.

Gynecological.

W. A. Warfield, M. D.
Wm. C. McNeill, M. D.
J. E. H. Taylor, M. D.
H. W. Lawson, M. D.

Assistants: S. L. Cook, M. D.; H. R Burwell, M. D.; J. W. Ross, M. D.

Obstetrical.

Edward D. Williston, M. D.
H. W. Freeman, M. D.
H. F. Kane, M. D.

Ophthalmological.

James C. Dowling, M. D. Assistant: E. A. Robinson, M. D.

Otology and Rhinology.

Jas. J. Richardson, M. D. Assistant: Hamilton S. Martin, M. D.

Neurology.

Tom A. Williams, M. D. Assistants: E. C. A. Wilson, M. D.; E. G. Mitchell, M. D.; Harry A. Bishop, M. D.

Genito-Urinary.

H. A. Fowler, M. D. Assistants: Milton A. Francis, M. D.; R. Arthur Hooe, M. D.

Orthopedics.

Wm. G. Erving, M. D.; John Dunlop, M. D. Assistant: Chas. A. Allen, M. D.

Pediatrics.

Wm. J. French, M. D.; E. H. Reede, M. D.; E. P. Copeland, M. D. Assistant: A. B. McKinney, M. D.

Dental Surgeons.

Geo. H. Butcher, D. D. S.; F. P. V. Barrier, D. D. S.

OUTDOOR.

Medical.

W. E. Lewis, M. D.
U. J. Daniels, M. D.
C. A. Tignor, M. D.
J. F. Dyer, M. D.
E. J. Watson, M. D.
E. De J. McSween, M. D.
Lee A. Gill, M. D.
W. F. Phillips, M. D.
F. D. Whitby, M. D.

Minor Surgery.

Wm. A. Jack, M. D.; C. W. Childs, M. D.; A. L. Curtis, M. D.

Ophthalmological.

James C. Dowling, M. D. Assistants: E. C. A. Wilson, M. D.; E. A. Robinson, M. D.

Otology and Rhinology.

Jas. J. Richardson, M. D. Assistants: Hamilton S. Martin, M. D.; U. L. Houston, M. D.

Neurology.

Tom A. Williams, M. D. Assistants: E. C. A. Wilson, M. D.; E. G. Mitchell, M. D.; Harry A. Bishop, M. D.

Genito-Urinary.

H. A. Fowler, M. D. Assistants: Milton A. Francis, M. D.; Ivy Albert Pelzman, M. D.; R. Arthur Hooe, M. D.

Gynecology.

Wm. C. McNeill, M. D. Assistants: Chas. H. Marshall, M. D.; H. R. Burwell, M. D.; C. J. Young, M. D.

Orthopedics.

Wm. G. Erving, M. D.; John Dunlop, M. D. Assistant: Chas. A. Allen, M. D.

Pediatrics.

John W. Mitchell, M. D.; Marie B. Lucas, M. D.

Dermatology.

H.H.Hazen, M. D. Assistants: C. C. Lathers, M. D.; Paul Zinkham, M. D.

Tuberculosis.

James T. Blue, M. D.

REPORT OF THE FREEDMEN'S HOSPITAL.

WASHINGTON, D. C., *August 30, 1918.*

SIR: I have the honor to submit the annual report of the Freedmen's Hospital for the fiscal year ended June 30, 1918.

The demands upon the hospital during the past year can not be said to have been greater than the preceding one, but in many instances they were more difficult to satisfy. The unusual cost of all supplies, the difficulty of obtaining competent help, and the loss of so many members of the medical and surgical staffs who entered the military service added to the task of complying with many legitimate demands.

These difficulties, however, may be said to be only trifling incidents to the war in which the country is engaged, and can be borne, serving as a reminder that the greatest possible efforts should be constantly put forth to keep the work of the hospital in all respects up to the highest possible standard.

PATIENTS.

Three thousand six hundred and forty-eight patients were received into the hospital for care and treatment during the year; 244 were remaining from the preceding year, making a total of 3,892 under care. Of the number admitted, including births, 609 were pay patients, 1,332 United States, and 1,717 District of Columbia. The increase in the number of pay patients was quite noticeable; 609 were received, as against 375 last year. The revenue from this source amounted to $11,455.35.

On account of the high cost of all hospital supplies, it became necessary to increases the rates of pay patients. Accordingly, with the approval of the department, the following rates became effective July 1, 1918:

	Per day.
Adults	$1.50
Children	.75
Babies	.40

There were discharged from the hospital during the year 3,674. Of this number, 1,949 had recovered, 1,053 improved, 252 unimproved, 66 not treated, and 354 died.

The surgical service, on the whole, was very satisfactory. One thousand nine hundred and thirteen operations were performed, with the following results: One thousand four hundred and twelve recovered, 395 improved, 10 unimproved, 96 died.

The medical service was interrupted for short periods several times by the quarantine of the medical wards on account of diphtheria and smallpox. The results in this service, however, were good.

In the out-patient department 8,254 were treated, as follows: Medical, 1,671; minor surgical, 464; pediatrical, 956; urological, 673; gynelogical, 937; oto-rinological, 1,386; neurological, 234; orthopedical, 227; dermatological, 573; and tuberculosis, 82.

There were 11,282 revisits to the several divisions of this department, 2,145 being for surgical dressings. Contrary to what was expected, in view of the increased population of the city, there was a falling off of the number of patients treated, both indoor and outdoor, as compared with the preceding fiscal year.

Patients admitted each year for the past 44 years.

Year ending June 30—		Year ending June 30—		Year ending June 30—	
1875	190	1890	2,392	1905	2,918
1876	319	1891	2,373	1906	2,207
1877	500	1892	2,331	1907	2,366
1878	519	1893	2,422	1908	2,669
1879	642	1894	2,801	1909	2,590
1880	819	1895	2,476	1910	2,740
1881	892	1896	2,596	1911	2,900
1882	1,102	1897	2,815	1912	3,385
1883	1,373	1898	2,355	1913	3,208
1884	1,509	1899	2,374	1914	3,144
1885	1,794	1900	2,427	1915	3,348
1886	1,923	1901	2,414	1916	3,491
1887	2,017	1902	2,408	1917	3,886
1888	1,997	1903	2,677	1918	3,648
1889	2,074	1904	2,797		

STATISTICAL TABLE.

INDOOR SERVICE.

The following tables show, in classified detail, the number of medical and surgical cases admitted, discharged, diagnosis, operations, and results of the indoor patients:

Medical and surgical diseases, except pay patients.

Disease.	Remaining July 1, 1917.	Admitted.					Discharged.						Total number of days in hospital.	Average number of days in hospital.	Remaining July 1, 1918.
		White.		Colored.		Total.	Recovered.	Improved.	Unimproved.	Not treated.	Dead.	Total.			
		Male.	Female.	Male.	Female.										
Abscesses, infections, ulcers.															
Abscess:															
Alveolar	....	....	...	1	3	4	....	3	1	....	....	4	18	4.5	....
Arm	....	....	...	3	....	3	1	2	....	....	....	3	15	5	....
Breast	....	....	...	....	2	2	....	2	....	....	....	2	45	22.5	....
Eyelid	1	....	...	....	....	1	1	....	....	....	....	1	14	14	....
Ischio-rectal	....	....	...	4	6	10	5	3	....	....	1	9	309	34.3	1
Pancreas	....	....	...	....	1	1	1	....	....	....	....	1	22	22	....
Peritonsillar	....	....	...	2	1	3	1	2	....	....	....	3	24	8	....
Periurethral	....	....	...	2	....	2	2	....	....	....	....	2	88	44	....
Popliteal	....	....	...	1	....	1	....	1	....	....	....	1	22	22	....
Vulvo-vaginal	....	....	...	....	3	3	1	2	....	....	....	3	21	7	....

Medical and surgical diseases, except pay patients—Continued.

Disease.	Remaining July 1, 1917.	Admitted.					Discharged.						Total number of days in hospital.	Average number of days in hospital.	Remaining July 1, 1918.
		White.		Colored.		Total.	Recovered.	Improved.	Unimproved.	Not treated.	Dead.	Total.			
		Male.	Female.	Male.	Female.										
Abscesses, infections, ulcers—Continued.															
Infections:															
Eyelid	1				1	2	1	1				2	20	10	
Foot				10	4	14	6	4	1		1	12	328	27.3	2
Frontal sinus	1			1	1	3	1	1				2	111	55.5	1
Hand				3	3	6	2	3	1			6	127	21.1	
Scalp					1	1		1				1	16	16	
Scrotum	1			5		6	3	1			2	6	104	17.3	
Ulcers:															
Gastric				1	2	8		2				2	73	36.5	1
Varicose	1			5	2	8	3	4				7	207	29.5	1
Bones and joints.															
Ankylosis:															
Knee	1				1	2		2				2	309	54.5	
Shoulder				1		1		1				1	115	115	
Arthritis:															
Gonorrheal	1			8	3	12		11	1			12	512	42.6	
Infectious	8			4	9	21	3	16	1			20	917	45.8	1
Tubercular—															
Elbow				1		1									1
Hip				1	2	3		2			1	3	218	72.6	
Knee	4			1	3	8		6				6	573	95.5	2
Vertebrae				9	3	12		7	1		1	9	368	40.8	3
Deformities:															
Cleft palate					1	1			1			1	8	8	
Contractions	2			1	2	5		5				5	543	108.6	
Genu valgum				3		3	2					2	180	90	1
Pes planus				2		2		2				2	23	11.5	
Scoliosis	2					2	1	1				2	177	88.5	
Dentigerous cyst	1					1		1				1	10	10	
Dislocations:															
Femur				3	1	4	2	1				3	23	7.6	1
Humerus				2		2	2					2	2	1	
Semilunar cartilage				1	2	3	1	2				3	29	9.6	
Ulna				2		2		2				2	66	33	
Vertebrae				1		1		1				1	191	191	
Fracture:															
Clavicle				5		5	1	4				5	98	19.6	
Femur	3			11	2	16	4	8			2	14	549	39.2	2
Fibula				3		3	1	2				3	115	38.3	
Humerus				2	2	4	1	2			1	4	100	25	
Mandible	1			2	1	4	1	3				4	120	30	
Olecranon					1	1			1			1	7	7	
Radius				7	1	8	1	6	1			8	252	31.5	
Rib	1			1	1	3	1	1			1	3	148	49.3	
Skull	1			7	2	10	3	3			3	9	216	24	1
Tibia	1			10	4	15	6	7			2	15	1,051	70	
Vertebrae				1		1					1	1	8	8	
Osteomyelitis:															
Antrum of highmore				1	1	2	1	1				2	10	5	
Fibula				1		1									1
Humerus				1		1	1					1	61	61	
Ilium				1		1		1				1	29	29	
Mandible					2	2		1			1	2	18	9	
Os calcis				1		1									1
Phalanx					1	1		1				1	23	23	
Rib				1	1	2	1					1	39	39	1
Tibia	1			8	5	14	4	4	2			10	656	65.6	4
Periostitis	2			1		3		2	1			3	39	13	
Sprain:															
Ankle				6	2	8	5	3				8	198	24.7	
Sacro-iliac	3			9	2	14	4	8	1			13	505	38.8	1
Synovitis				4	3	7	3	2				5	162	32.4	2

Medical and surgical diseases, except pay patients—Continued.

Disease.	Remaining July 1, 1917.	Admitted.					Discharged.						Total number of days in hospital.	Average number of days in hospital.	Remaining July 1, 1918.
		White.		Colored.		Total.	Recovered.	Improved.	Unimproved.	Not treated.	Dead.	Total.			
		Male.	Female.	Male.	Female.										
Circulatory system.															
Acute dilatation, heart	....	....	...	2	......	2	......	......	....	....	2	2	82	41	....
Aneurysm:															
Aorta	....	....	...	2	2	4	......	3	1	....	....	4	314	78.5	....
Innominate	....	....	...	1	......	1	......	1	....	....	....	1	21	21	....
Angina pectoris	....	....	...	1	......	1	......	1	....	....	....	1	11	11	....
Arterio sclerosis	....	....	...	1	3	4	......	2	2	....	....	4	52	13	....
Cerebral hemorrhage	2	....	...	1	3	6	......	1	....	....	4	5	210	42	1
Gangrene:															
Finger	....	....	...	......	1	1	......	1	....	....	....	1	5	5	....
Foot	1	....	...	6	6	13	1	5	1	....	5	12	656	54.6	1
Hemorrhoids	....	....	...	18	3	21	13	4	1	....	1	19	275	14.4	2
Myocarditis	....	....	...	3	2	5	......	1	....	....	3	4	90	22.5	1
Thrombo-phlebitis	1	....	...	......	......	1	......	1	....	....	....	1	94	94	....
Valvular diseases:															
(*a*) Regurgitation:															
Aortic	2	....	...	7	......	9	......	3	....	....	6	9	358	39.7	....
Mitral	4	....	...	43	23	70	......	35	5	....	18	58	2,276	39.2	12
(*b*) Stenosis:															
Aortic	1	....	...	......	......	1	......	1	....	....	....	1	31	31	....
Mitral	....	....	...	......	2	2	......	2	....	....	....	2	163	81.5	....
Varicose veins	1	....	...	......	3	4	1	3	....	....	....	4	216	54	....
Constitutional diseases.															
Anemia, secondary	....	....	...	......	4	4	......	2	....	....	2	4	48	12	....
Diabetes mellitus	....	....	...	1	2	3	......	......	....	....	2	2	27	13.5	1
Hemophilia	....	....	...	2	......	2	......	......	....	....	2	2	6	3	....
Hodgkins	....	....	...	......	1	1	......	1	....	....	....	1	32	32	....
Malnutrition	3	....	...	10	11	24	......	4	....	....	19	23	441	14.8	1
Rickets	1	....	...	7	6	14	......	11	....	....	1	12	878	73	2
Digestive system															
Appendicitis:															
Acute	2	....	...	17	18	37	18	6	....	....	8	32	761	23.3	5
Chronic	1	....	...	10	17	28	21	4	1	1	1	28	706	25	....
Constipation	....	....	...	9	10	19	6	10	....	....	....	16	169	10.5	3
Enteritis	2	....	...	19	17	38	10	9	1	....	15	35	469	13.4	3
Fissure-in-ano	....	....	...	1	1	2	2	......	....	....	....	2	27	13.5	....
Fistula-in-ano	4	....	...	10	18	32	13	13	3	....	....	29	551	19	3
Hair lip	....	....	...	......	1	1	......	......	1	....	....	1	6	6	....
Hernia:															
Inguinal	4	4	...	54	6	68	47	12	3	....	1	63	1,348	21.4	5
Umbilical	....	....	...	......	3	3	2	......	....	....	1	3	59	19.6	....
Intestinal obstruction	....	....	...	2	2	4	......	......	....	....	4	4	13	3.2	....
Intestinal parasites	1	....	...	1	1	3	2	1	....	....	....	3	97	32.3	....
Liver:															
Cholecystitis	1	....	...	1	3	5	2	3	....	....	....	5	95	19	....
Cholelithiasis	....	....	...	......	2	2	1	1	....	....	....	2	108	54	....
Cirrhosis	....	....	...	1	1	2	......	1	....	....	1	2	41	20.5	....
Postoperative adhesions	....	....	...	1	......	1	......	1	....	....	....	1	19	19	....
Prolapsed rectum	1	....	...	1	......	2	......	2	....	....	....	2	196	97.5	....
Ranula	....	....	...	......	1	1	......	......	....	....	....	......	......	......	1
Stomach:															
Carcinoma	1	....	...	3	6	10	......	2	....	....	8	10	337	33.7	....
Gastritis—															
Acute	1	....	...	7	6	14	9	3	1	....	1	14	98	7	....
Chronic	....	....	...	1	5	6	......	4	2	....	....	6	200	33.3	....
Stricture rectum	3	....	...	1	9	13	......	10	3	....	....	13	226	17.4	....
Tongue-tie	....	....	...	1	......	1	1	......	....	....	....	1	8	8	....
Eye, ear, nose, and throat.															
Eye:															
Amaurosis	....	....	...	1	1	2	1	......	....	....	....	1	1	1	1
Cataract, senile	1	....	...	3	3	7	2	2	1	....	....	5	148	29.6	2
Conjunctivitis	....	....	...	5	2	7	3	3	....	....	....	6	144	24	1
Corneal ulcer	....	....	...	2	4	6	2	3	....	....	....	5	265	53	1
Glaucoma	....	....	...	2	......	2	......	2	....	....	....	2	118	59	....
Gonorrheal ophthalmia	....	....	...	......	2	2	......	......	....	....	....	......	......	......	2

Medical and surgical diseases, except pay patients—Continued.

Disease.	Remaining July 1, 1917.	Admitted.					Discharged.						Total number of days in hospital.	Average number of days in hospital.	Remaining July 1, 1918.
		White.		Colored.		Total.	Recovered.	Improved.	Unimproved.	Not treated.	Dead.	Total.			
		Male.	Female.	Male.	Female.										
Eye, ear, nose, and throat—Continued.															
Eye—Continued.															
Iridocyclitis	....	....	....	3	....	3	1	2	....	....	....	3	118	38.3	....
Iritis	1	....	....	3	7	11	3	8	....	....	....	11	388	35.2	....
Optic atrophy	....	....	....	3	1	4	....	2	2	....	....	4	52	13	....
Panophthalmitis	....	....	....	2	2	4	3	1	....	....	....	4	241	60.2	....
Phthisis bulbi	....	....	....	1	1	2	2	....	....	....	....	2	50	25	....
Ptosis eyelid	....	....	....	....	2	2	....	2	....	....	....	2	103	51.5	....
Ear:															
Mastoiditis	....	....	....	....	1	1	....	1	....	....	....	1	1	1	....
Otitis media	1	....	....	....	2	3	1	2	....	....	....	3	91	30.3	....
Nose:															
Epistaxis	....	....	....	4	1	5	3	2	....	....	....	5	31	6.2	....
Throat:															
Hypertrophied tonsils	2	1	1	97	112	213	148	35	22	....	....	205	1,801	8.7	8
Genito-urinary system.															
Acute retention	....	....	....	2	....	2	1	1	....	....	....	2	9	4.5	....
Chancroids	2	....	....	15	3	20	3	14	2	....	....	19	469	24.6	1
Cystitis	2	....	....	3	7	12	5	7	....	....	....	12	294	24.5	....
Epididymitis:															
Gonorrheal	....	....	....	26	....	26	10	13	....	....	....	23	413	18	3
Tubercular	....	....	....	1	....	1	....	1	....	....	....	1	42	42	....
Fistula, perineal	1	....	....	3	....	4	1	2	....	....	1	4	293	73.2	....
Gonorrhea	2	....	....	17	4	23	5	17	1	....	....	23	309	13.4	....
Hematuria, traumatic	....	....	....	1	1	2	1	1	....	....	....	2	24	12	....
Hydrocele	....	....	....	8	....	8	3	2	2	1	....	8	108	13.5	....
Kidney:															
Acute nephritis	1	....	....	6	6	13	1	6	1	....	5	13	291	2	....
Chronic interstitial nephritis	5	....	....	22	31	58	....	20	4	1	31	56	1,225	21.8	2
Floating kidney	....	....	....	....	1	1	1	....	....	....	....	1	31	31	....
Renal calculus	....	....	....	2	....	2	....	1	....	....	....	1	1	1	1
Ruptured kidney	....	....	....	1	....	1	1	....	....	....	....	1	15	15	....
Tuberculosis of kidney	....	....	....	4	....	4	....	1	2	....	1	4	108	27	....
Orchitis	1	....	....	6	....	7	2	4	1	....	....	7	110	15.7	....
Phimosis	3	4	....	55	....	62	41	13	6	....	....	60	825	13.7	2
Prostatitis	4	....	....	8	....	12	3	6	1	....	2	12	682	56.8	....
Stricture	1	....	....	15	....	16	1	14	....	....	....	15	145	9.6	1
Urethral caruncle	....	....	....	....	1	1	1	....	....	....	....	1	14	14	....
Venereal warts	....	....	....	....	1	1	....	1	....	....	....	1	28	28	....
Vesical calculus	1	....	....	....	....	1	....	1	....	....	....	1	16	16	....
Gynecological.															
Abortion	....	....	....	....	33	33	23	7	1	....	2	33	399	12	....
Abortion, threatened	1	....	....	....	4	5	1	3	1	....	....	5	34	6.8	....
Cancer, cervix	1	....	....	....	21	22	....	9	11	....	2	22	786	35.6	....
Congenital absence of uterus	....	....	....	....	1	1	....	....	1	....	....	1	25	25	....
Ectopic gestation	1	....	....	....	4	5	2	1	1	....	1	5	121	24.2	....
Endometritis	....	....	....	....	16	16	11	5	....	....	....	16	298	18.6	....
Fibroma uteri	9	....	....	....	123	132	107	7	8	....	5	127	3,209	25.7	5
Lacerated cervix	....	....	....	....	2	2	1	1	....	....	....	2	27	13.5	....
Lacerated perineum	3	....	....	....	14	17	14	1	2	....	....	17	422	24.9	....
Menstrual disorders:															
Dysmenorrhea	....	....	....	....	4	4	1	3	....	....	....	4	251	62.7	....
Menopause	....	....	....	....	3	3	1	1	1	....	....	3	41	13.6	....
Menorrhagia	1	....	....	....	4	5	1	3	....	....	....	4	41	10.2	1
Ovary:															
Cystic ovary	8	....	....	....	40	48	37	11	....	....	....	48	1,111	23	....
Dermoid cyst	....	....	....	....	2	2	2	....	....	....	....	2	49	24.5	....
Ovarian cyst	....	....	....	....	2	2	2	....	....	....	....	2	32	16	....
Postoperative adhesions	1	....	....	....	4	5	1	3	....	....	....	4	140	35.3	1
Procidentia	....	....	....	....	8	8	6	....	2	....	....	8	1,181	22.6	....
Pyosalpingitis	6	....	....	....	62	68	53	4	6	....	4	67	1,720	25.6	1
Retroverted uterus	....	....	....	....	7	7	6	1	....	....	....	7	166	23.7	....
Salpingitis	4	....	....	....	113	117	68	24	12	....	2	106	2,379	2 .4	11

Medical and surgical diseases, except pay patients—Continued.

Disease.	Remaining July 1, 1917.	Admitted.					Discharged.						Total number of days in hospital.	Average number of days in hospital.	Remaining July 1, 1918.
		White.		Colored.											
		Male.	Female.	Male.	Female.	Total.	Recovered.	Improved.	Unimproved.	Not treated.	Dead.	Total.			
Infectious diseases.															
Actinomycosis	....	....	...	1	1	......	......	......	....	....	1	1	16	16	....
Broncho-pneumonia	1	....	...	11	13	25	9	4	1	....	11	25	526	21.4	....
Cerebrospinal meningitis	....	....	...	8	3	11	......	1	1	....	9	11	107	9.7	....
Diphtheria	....	....	...	1	1	2	......	1	....	....	1	2	36	18	....
Erysipelas	....	....	...	2	1	3	3	......	....	....	....	3	61	20.3	....
Influenza	....	....	...	13	6	19	13	4	1	....	....	18	168	9	1
Malaria	2	....	...	2	1	5	3	2	....	....	....	5	125	25	....
Measles	....	....	...	1	......	1	......	......	1	....	....	1	1	1	....
Pellagra	1	....	...	......	1	2	......	1	1	....	....	2	35	17.5	....
Pneumonia, lobar	1	....	...	49	22	72	33	10	2	....	26	71	1,271	17.9	1
Rheumatic fever	1	....	...	15	18	34	9	18	1	....	2	30	886	29.6	4
Septicæmia	....	....	...	......	1	1	......	......	....	....	1	1	27	27	....
Syphilis:															
Cerebral	....	....	...	4	4	8	......	5	1	....	2	8	280	35	....
Congenital	....	....	...	1	......	1	......	......	....	....	1	1	8	8	....
Primary	1	....	...	4	5	10	......	9	....	....	....	9	379	42.1	1
Secondary	6	1	...	27	16	50	......	41	4	....	....	45	1,156	25.6	5
Tertiary	5	1	...	6	11	23	......	19	1	1	1	22	1,068	49.4	1
Tuberculosis	1	....	...	18	12	31	......	5	15	....	11	31	567	18.3	....
Typhoid fever	2	....	...	22	23	47	30	4	1	....	9	44	1,324	30	3
Whooping cough	....	....	...	1	......	1	......	1	....	....	....	1	17	17	....
Injuries.															
Burn:															
Body	....	....	...	2	4	6	1	......	1	....	3	5	330	66	1
Face	1	....	...	1	......	2	1	......	....	....	....	1	9	9	1
Foreign body in throat	....	....	...	1	1	2	......	1	1	....	....	2	32	16	....
Wounds:															
Contused—															
Abdomen	....	....	...	3	......	3	1	2	....	....	....	3	15	5	....
Body	....	....	...	4	5	9	4	3	1	....	....	8	111	13.9	
Face	....	....	...	3	1	4	3	1	....	....	....	4	33	8.2	....
Hand	2	....	...	2	......	4	1	3	....	....	....	4	46	11.5	....
Leg	1	....	...	6	3	10	3	6	....	....	....	9	122	13.5	1
Scalp	....	1	...	2	3	6	1	5	....	....	....	6	23	3.8	....
Gunshot	1	....	...	12	1	14	6	5	....	....	3	14	214	15.3	....
Incised—															
Back	....	....	...	1	......	1	1	......	....	....	....	1	8	8	....
Foot	1	....	...	2	......	3	1	2	....	....	....	3	102	34	....
Hand	....	....	...	1	......	1	1	......	....	....	....	1	10	10	....
Knee	....	....	...	1	......	1	......	1	....	....	....	1	7	7	....
Lacerated—															
Breast	....	....	...	......	1	1	......	1	....	....	....	1	3	3	....
Foot	1	....	...	2	......	3	1	2	....	....	....	3	93	31	....
Hand	....	1	...	1	1	3	1	2	....	....	....	3	21	7	....
Scalp	....	1	1	10	2	14	4	9	....	....	....	13	81	6.2	1
Scrotum	....	....	...	2	......	2	1	1	....	....	....	2	24	12	....
Punctured, foot	....	....	...	4	1	5	2	2	1	....	....	5	62	12.4	....
Lymphatic system.															
Adenitis:															
Cervical	5	....	...	5	14	24	5	12	4	....	....	21	712	33.8	3
Inguinal	1	....	...	33	6	40	16	19	3	....	....	38	607	16	2
Peritonitis, tubercular	1	....	...	4	4	9	......	6	....	....	3	9	274	30.44	....
Concussion, brain	....	....	...	1	1	2	......	2	....	....	....	2	44	22	....
Dementia precox	1	....	...	2	3	6	......	4	2	....	....	6	94	15.6	....
Epilepsy	....	2	...	5	4	11	......	9	2	....	....	11	182	16.5	....
Hysteria	....	....	...	......	6	6	2	2	2	....	....	6	70	11.6	....
Neurasthenia	4	....	1	1	11	17	3	13	1	....	....	17	297	17.3	....
Neuritis	....	1	...	5	3	9	2	5	1	....	....	8	169	21.1	1
Paralysis	5	1	...	4	5	15	......	8	1	....	4	13	964	74.1	2
Traumatic shock	....	....	...	1	1	2	1	1	....	....	....	2	26	13	....

Medical and surgical diseases, except pay patients—Continued.

Disease.	Remaining July 1, 1917.	Admitted.					Discharged.						Total number of days in hospital.	Average number of days in hospital.	Remaining July 1, 1918.
		White.		Colored.											
		Male.	Female.	Male.	Female.	Total.	Recovered.	Improved.	Unimproved.	Not treated.	Dead.	Total.			
Obstetrical.															
Births:															
Living				141	160	301	275				15	290	3,876	13.3	11
Remaining	9					9	8				1	9	123	13.6	
Babies with mother	1			3	3	7				7		7	87	12.4	
Pregnancy:															
Delivered	11				323	334	312				7	319	6,532	20.4	15
Undelivered					38	38			33			33	249	7.5	5
Puerperal sepsis					1	1	1					1	9	9	
Puerperium	11				8	19	15	1	1		2	19	415	21.8	
Toxemia of pregnancy					3	3	2				1	3	51	17	
Stillbirth				19	17										
Poisoning.															
Alcohol		3	1	5		9	5	4				9	95	10.5	
Autointoxication				6	10	16	6	7	1		1	15	151	10	1
Carbolic acid					1	1	1					1	2	2	
Gas				1		1	1					1	1	1	
Iodine				1	1	2	1	1				2	4	2	
Lysol					1	1	1					1	3	3	
Mercury					2	2	1	1				2	28	14	
Morphine		1		1		2			1		1	2	3	15	
Ptomain				1		1	1					1	4	4	
Sunstroke				2		2		1			1	2	2	1	
Respiratory system.															
Bronchial asthma	1			6	2	9		4	2		2	8	237	29.6	1
Bronchitis:															
Acute				15	7	22	13	9				22	242	11	
Chronic				1	1	2		1	1			2	95	47.5	
Pleura:															
Empyema	2			4	4	10	1	5			4	10	857	85.7	
Pleurisy, acute	2			5	7	14	7	6				13	356	27.3	
Trachealstenosis				2		2		1	1			2	53	26.5	
SKIN.															
Erythema multiforma				1		1		1				1	7	7	
Eczema				2	1	3	1	1				2	47	23.5	1
Pemphigus					1	1					1	1	57	57	
Purpura simplex					1	1	1					1	23	23	
Scabies				1		1		1				1	9	9	
Urticaria				1	1	2	1	1				2	21	10.5	
Tumors.															
Carcinoma:															
Breast	2				9	11		7	1		3	11	250	22.7	
Oesophagus				1		1					1	1	77	77	
Penis				1		1					1	1	99	99	
Rectum				3	1	4		1	1		1	3	38	12.6	1
Stomach	2			1		3		2			1	3	128	42.6	
Tongue	1					1					1	1	17	17	
Dentigerous cyst	1					1		1				1	45	45	
Fibroma breast					3	3	2	1				3	48	16	
Goiter:															
Exophthalmic				1	2	3	1	1			1	3	62	20.6	
Simple	2				5	7	5				1	6	151	25.1	1
Hodgkins				1		1		1				1	122	12.2	
Papilloma bladder				1		1					1	1	15	15	
Sarcoma:															
Mandible				2		2		1				1	80	80	1
Retroperitoneal	1			1		2		1	1			2	50	25	
Thyroid				2		2		1			1	2	86	43	
Sebaceous cyst., neck				1		1	1					1	28	28	
Total	228	22	4	1,248	1,765	3,267	1,637	902	223	11	314	3,087			180

Medical and surgical diseases, pay patients.

Disease.	Remaining July 1, 1917.	Admitted.					Discharged.						Total number of days in hospital.	Average number of days in hospital.	Remaining July 1, 1918.
		White.		Colored.											
		Male.	Female.	Male.	Female.	Total.	Recovered.	Improved.	Unimproved.	Not treated.	Dead.	Total.			
Abortion					5	5	4	1				5	63	12.6	
Adenitis:															
Cervical				2	5	7	3	2	1			6	57	9.5	1
Inguinal				6		6	4	2				6	58	9.6	
Alcoholism				4		4	1	3				4	42	10.5	
Aneurysm				1	1	2			2			2	17	8.5	
Appendicitis	1			10	6	17	10	4			2	16	224	14	1
Arthritis, infectious	1			1	8	10		9				9	239	26.6	1
Autointoxication				2	1	3	2	1				3	30	10	
Births	1			22	25	48	45				2	47	606	12.8	1
Babies with mother					2	2						2	11	11	1
Bronchitis	1				4	5	2	2	1			5	68	13.6	
Carcinoma:															
Bladder				2		2			1		1	2	81	40.5	
Breast					5	5	2	1			1	4	75	18.7	1
Cervix					8	8		4		1	2	7	127	18.1	1
Liver				2	1	3		1			2	3	111	37	
Tongue	1			3		4		2	1		1	4	95	23.7	
Cataract					1	1		1				1	23	23	
Chorea					2	2		1			1	2	4	2	
Cholecystitis					1	1		1				1	22	22	
Cirrhosis, liver				1		1		1				1	14	14	
Cystic ovary					7	7	6					6	108	18	1
Diabetes				2	1	3		3				3	72	24	
Dislocation:															
Femur					1	1		1				1	35	35	
Tibia					1	1									1
Ectopic gestation					2	2	2					2	33	16.5	
Eczema				2		2		2				2	58	29	
Endometritis	1				7	8	5	2				7	67	9.5	1
Fibroma uteri	1				53	54	43	3	2		3	51	965	19.3	3
Fracture:															
Clavicle				2		2		1				1	15	15	1
Femur				1	1	2	1					1	48	48	1
Fibula				1		1		1				1	7	7	
Humerus		1			1	2		2				2	48	24	
Maxilla					1	1	1					1	28	28	
Patella					1	1	1					1	60	60	
Radius				1	1	2		1	1			2	10	5	
Tibia				1		1		1				1	56	56	
Frontal sinusitis				1		1	1					1	14	14	
Gangrene:															
Foot				1		1	1					1	14	14	
Testicle				1		1	1					1	20	20	
Gastritis			1	6	4	11	1	8				9	128	14.2	2
Gonorrhea				4		4		3	1			4	31	7.7	
Gunshot, lung				1		1		1				1	18	18	
Hallux valgus					1	1	1					1	11	11	
Hemorrhoids				1	3	4	3					3	30	10	1
Hernia, inguinal				9	2	11	11					11	159	14.4	
Hydrocele				1		1	1					1	14	14	
Hypertrophy, prostate				2		2	1	1				2	56	28	
Hypertrophy, tonsils			1	27	32	60	46	12	1			59	182	3	1
Influenza				2		2	2					2	15	7.5	
Intestinal obstruction				1	1	2	1	1				2	68	34	
Jacksonian epilepsy				1	1	2		2				2	17	8.5	
Lacerated perineum					5	5	4	1				5	110	22	
Lipoma shoulder					2	2	1					1	29	29	1
Lues				4	1	5		4	1			5	73	14.6	
Malnutrition				1		1					1	1	14	14	
Mastoiditis				1		1		1				1	13	13	
Measles					1	1	1					1	15	15	
Meningitis					1	1					1	1	16	16	
Mitral insufficiency				6	5	11	5	5	1			11	244	22.1	
Mixed tumor parotid					1	1		1				1	7	7	
Nasal polypi					1	1		1				1	13	13	
Nephritis	4			11	10	25		9	1		12	22	790	36	3
Neurasthenia				1	9	10	1	5	2	1		9	122	13.5	1
Oedema larynx				1		1					1	1	3	3	
Osteomyelitis tibia				1	2	3		1				1	28	28	2
Paralysis	1	1		2	5	9		6			2	8	254	31.7	1

Medical and surgical diseases, pay patients—Continued.

Disease.	Remaining July 1, 1917.	Admitted.					Discharged.						Total number of days in hospital.	Average number of days in hospital.	Remaining July 1, 1918.
		White.		Colored.											
		Male.	Female.	Male.	Female.	Total.	Recovered.	Improved.	Unimproved.	Not treated.	Dead.	Total.			
Parotid cyst				1		1	1					1	10	10	
Periurethral abscess				1		1	1					1	6	6	
Phimosis				10		10	5	3	2			10	51	5.1	
Pleurisy					1	1		1				1	7	7	
Pneumonia	1			5	7	13	5	4			4	13	228	17.5	
Postoperative adhesions	1	11			6	8	4	2				6	188	31.3	2
Pyosalpingitis	1				42	43	27	6	3		3	39	698	17	4
Pregnancy	1				55	56	48		6			54	803	14.7	2
Prepatellar bursitis					1	1		1				1	21	21	
Puerperal sepsis					2	2		1	1			2	22	11	
Pulmonary tuberculosis				1	2	3		2	1			3	48	16	
Sciatic neuritis				1	2	3		3				3	59	19.6	
Strabismus					1	1		1				1	22	22	
Stricture, rectum				1	1	2		2				2	20	10	
Thyrotoxicosis				1	2	3	1	1				2	130	65	1
Stricture, urethra				3		3	1	2				3	23	7.6	
Torticollis				1		1	1					1	8	8	
Toxemia pregnancy					1	1	1					1	9	9	
Typhoid fever				2	3	5	3				1	4	56	14	1
Ulcer cornea				1		1		1				1	22	22	
Use operating room		1		10		11				11		11			
Varicose veins				3	1	4		4				4	46	11.5	
Vesico vaginal fistula				2	1	3	1	1				2	34	17	1
X ray				20	21	41				41		41			
Total	16	4	2	215	388	625	312	151	29	55	40	587			38
Stillbirths					2										

Operations and results, all patients.

Operation.	Diagnosis.	White.		Colored.		Total.	Recovered.	Improved.	Unimproved.	Died.
		Male.	Female.	Male.	Female.					
Adenectomy	Adenitis:									
	Cervical			4	7	11	5	6		
	Inguinal			20	4	24	17	7		
Adenoidectomy	Adenoids	1	1	82	108	192	162	30		
Amputation:										
Breast	Carcinoma				3	3	1	2		
	Tuberculosis				1	1		1		
Cervix	Carcinoma				4	4	2	2		
	Elongated				1	1	1			
	Endocervicitis				3	3	3			
	Lacerated				3	3	2	1		
	Polypus				1	1	1			
	Procidential uteri				1	1	1			
Finger	Gangrene				2	2	2			
	Osteomyelitis				1	1	1			
Foot	Gangrene			1		1				
Leg	Compound comminuted fracture.			4		4	1	1		1
	Gangrene			3	2	5	1			2
	Osteomyelitis				1	1	1			
	Tuberculosis (knee)			1	1	2	1	1		4
Toes	Osteomyelitis			1		1		1		
	Tuberculosis			1		1	1			
Arthrectomy	Tuberculosis (knee joint)			1	2	3		3		
Arthroplasty	Ankylosis (knee)			1	1	2		2		
	Hallux valgus				1	1	1			
Canthoplasty	Ulcer of cornea			1	3	4	1	3		

Operations and results, all patients—Continued.

Operation.	Diagnosis.	White.		Colored.		Total.	Recovered.	Improved.	Unimproved.	Died.
		Male.	Female.	Male.	Female.					
Cauterization:										
Anus	Condylomata			1				1		
Cervix	Carcinoma				3	3		3		
Cornea	Ulcer			1	2	3	1	2		
Groin	Chanchroidal ulcer			1				1		
Knee	Tuberculosis				1	1		1		
Tongue	Carcinoma			1		1				1
Umbilicus	Epithelioma				1	1		1		
Urethra	Chanchroidal ulcer				1	1		1		
Vulva	do					2	1	1		
Celiotomy	Appendectomy:									
	Acute appendicitis			2	3	5	2	1		2
	Chronic appendicitis			18	144	162	145	13		4
	Gangrenous appendicitis			3		3	2			1
	Perforative appendicitis			6	4	10	5			5
	Subacute appendicitis			1		1	1			
	Suppurative appendicitis			1	3	4	3	1		
Caesarean section:										
	Contracted pelvis				3	3	3			
	Eclampsia, puerperal				7	7	3			4
Cholecystostomy	Cholelithiasis				2	2	1	1		
	Acute cholecystitis				1	1	1			
	Chronic cholecystitis				1	1	1			
	Chronic pancreatitis				1	1		1		
Cystotomy	Calculi, vesical			1		1				1
	Carcinoma, vasical			1		1			1	
	Hypertrophied prostate			4		4	3			1
Enterostomy	Intestinal obstruction				2					2
Exploratory	Carcinoma:									
	Gall bladder				1	1				1
	Liver				1	1				1
	Caranomatosis (general)				1	1			1	
	Fibroid uterus (inoperable)				1	1			1	
	Peritonitis (diffuse)				2	2	1			1
	Peritonitis (tuberculous)			3	3	6	1	3		2
	Pregnancy (indefinite)				1	1			1	
	Retroperitoneal sarcoma			2				1	1	
	Visceroptosis				1	1				1
Freeing of adhesions.	Ovarian adhesions				1	1		1		
	Obstruction, intestinal			1	2	3	2			1
	Postoperative adhesions			2	7	9	6	3		
Gastro-enterostomy (posterior).	Carcinoma of pylorus			2		2		2		
Hysterectomy, Pan.	Carcinoma of uterus				1	1		1		
	Fibroid uterus				1	1	1			
Supra vaginal.	do				34	34	26	4		4
	Infected uterus				1	1				1
	Myoma uteri				1	1	1			
	Myofibromata uteri				3	3	3			
	Procidentia uteri (complete)				3	3	3			
	Subinvolution (uterus)				1	1	1			
Vaginal	Fibroid uterus				2	2	2			
	Procidentia uteri				1	1	1			
Hysterorrhaphy	Punctured uterus				1	1	1			
	Ruptured uterus				1	1	1			
Hystero-oophorectomy.	Fibroid uterus and ovarian cyst.				4	4	2	1		1
	Ovarian abscess				1	1	1			
Hystero-salpingectomy.	Fibroid uterus				7	7	6	1		
	Fibroid uterus and hydrosalpinx.				1	1	1			
	Fibroid uterus and salpingitis				5	5	5			
	Pyosalpingitis				1	1	1			
Hystero-salpingo-oophorectomy:										
	Fibroma uteri				31	31	30			1
	Fibroma uteri, pyosalpinx, and cystic ovaries.				3	3	3			
	Fibroma uteri, salpingitis, and cystic ovaries.				33	33	31	1		1
	Fibroma uteri and cystic ovary				25	25	23	1		1
	Fibroma uteri and salpingitis				6	6	5	1		
	Pyosalpinx and cystic ovary				23	23	21	2		
	Salpingitis and cystic ovary				22	22	21	1		

Operations and results, all patients—Continued.

Operation.	Diagnosis.	White.		Colored.		Total.	Recovered.	Improved.	Unimproved.	Died.
		Male.	Female.	Male.	Female.					
Hystero-salpingo-oophorectomy.	Metritic uterus and pyosalpinx				9	9	9			
	Metritic uterus, salpingitis, and cystic ovary.				5	5	4	1		
	Metritic uterus and tubo-ovarian abscess.				3	3	2	1		
	Fibroma uteri, hydrosalpinx, and cystic ovary.				7	7	6	1		
	Fibroma uteri and hydrosalpinx.				2	2	2			
	Hydrosalpinx and cystic ovaries.				2	2	1	1		
	Hydrosalpinx, pyosalpinx, and cystic ovaries.				1	1	1			
	Bilateral pyosalpingitis				14	14	13	1		
	Bilateral salpingitis				2	2	1	1		
	Tubo-ovarian abscess				8	8	5			3
	Tubo-ovarian abscess and pyosalpinx.				6	6	6			
	Cystic ovary				3	3	3			
	Dermoid cyst (ovary)				1	1	1			
	Procidentia uteri				1	1	1			
	Salpingitis and cystic ovary									
	Sclerotic ovary (hystero-epilepsy).				1	1	1			
	Ectopic pregnancy and salpingitis.				1	1	1			
	Infantile uterus, pyosalpinx, and cystic ovary.				1	1				1
Myomectomy	Fibroma uteri (pedunculated)				5	5	4			1
Intestinal resection.	Fecal fistulæ				1	1				1
	Intestional obstruction				1	1	1			
	Injury to gut due to dense adhesions.				1	1				1
Oophorectomy	Cystic ovary				4	4	3		1	
	Fibro-cystic ovary				1	1	1			
	Sclerotic ovary				1	1	1			
Plastic	Cystic ovary				14	14	12	2		
Salpingectomy	Ectopic pregnancy				1	1	1			
	Pyosalpinx				1	1	1			
	Salpingitis				10	10	10			
	Varicosity of pampiniform plexus.				1	1	1			
Salpingo-oophorectomy.	Cystic ovary				9	9	9			
	Cystic ovary (hemorrhagic)				1	1	1			
	Ectopic pregnancy (tubal)				2	2	2			
	Pyosalpinx				5	5	5			
	Ovarian cyst				3	3	3			
	Ovarian cyst (dermoid)				1	1	1			
	Gun shot wound of broad ligament.				1	1				1
	Hydrosalpinx				1	1				1
	Hydrosalpinx and cystic ovary.				1	1				1
	Par ovarian cyst				1	1	1			
	Pyosalpinx and cystic ovary				10	10	9	1		
	Salpingitis				3	3	3			
	Salpingitis and cystic ovary				46	46	42	3		1
	Salpingo-oophoritis				7	7	6	1		
	Tubal abortion				1	1	1			
	Tubo-ovarian abscess				6	6	4	1		1
	Tubal pregnancy (ruptured at full term).				1	1				1
Schiassis	Hypertrophic cirrhosis of liver			1		1				1
Shortening round ligament.	Prolapsed uterus				2	2	2			
	Retroverted uterus				8	8	8			
Ventral suspension	do				1	1		1		
Murphy's suspension.	Procidentia uteri				1	1	1			
Circumcision	Phimosis			39		39	32	7		
	Chanchroidal phimosis			5		5	4	1		
	Congenital phimosis	3		10		13	11	2		
	Paraphimosis			6		6	5	1		
	Elongated prepuce			34		34	29	5		

Operations and results, all patients—Continued.

Operation.	Diagnosis.	White. Male.	White. Female.	Colored. Male.	Colored. Female.	Total.	Recovered.	Improved.	Unimproved.	Died.
Colporrhaphy (anterior).	Cystocele				2	2	1	1		
Curettement	Abscess of antrum of highmore			1		1		1		
	Anal fistula				1	1		1		
	Endocervicitis				4	4	4			
	Endometritis				25	25	23	2		
	Incomplete abortion				3	3	3			
	Inevitable abortion				1	1	1			
	Infected sinus			1		1		1		
	Osteomyelitis			7		7		7		
	Retained placenta				1	1	1			
	Retained secundines				10	10	8	2		
	Subinvoluted uterus				1	1	1			
	Traumatic ulcer				1	1	1			
	Ununited skin wound				1	1	1			
Decompression	Depressed fracture of skull			4		4	3	1		
Dilation	Fissure in ano			1	2	3	2	1		
	Prostatic bar obstruction			1		1		1		
	Stenosis of cervix				2	2	1	1		
	Stenosis of vagina				1	1	1			
	Stricture of rectum				7	7	1	5		1
	Stricture of urethra			3		3		3		
Enucleation	Fibroma of breast				1	1		1		
	Lipoma of buttock			1		1	1			
Eye	Glaucoma, absolute			1		1	1			
	Iridocyclitis				2	2	1	1		
	Keratoglobus			1		1	1			
	Panophthalmitis			2	2	4	3	1		
	Phthisis bulbi			1	1	2	2			
Epididymotomy	Epididymitis			3		3	2	1		
Exploratory	Carcinoma of rectum			2		2		1	1	
	Empyema			1		1	1			
	Fracture of neck and severance of spinal cord.			1		1				1
	Sarcoma of neck			1		1		1		
	Unruptured teeth				1	1		1		
Excision:										
Bursa	Prepatellar bursitis				1	1		1		
Cartilage	Displaced semilunar cartilage				1	1		1		
Gland	Adenitis			1	2	3	2	1		
Sac	Bartholonion cyst				1	1	1			
	Chalazion	1				1	1			
	Conjunctival cyst				1	1	1			
	Dacryocystitis				2	2	2			
	Hydrocele of cord			10		10	9	1		
	Intraligamentous cyst				1	1	1			
	Parotid cyst			1		1	1			
	Ranula				1	1	1			
	Ruptured ectopic				1	1	1			
	Ruptured ovarian cyst				1	1	1			
	Sebaceous cyst			3	1	4	2	2		
	Wharton's duct, cyst of			1		1	1			
Tongue, partial	Carcinoma of tongue			2		2		2		
Tract	Fistula in ano			8	14	22	16	6		
	Recto-vesical fistula			1		1		1		
	Scrotal-urethral fistula			1		1		1		
	Supra pubic vesical fistula			1		1		1		
	Vulvo-vaginal fistula				1	1		1		
Tumor	Anal condylomata				1	1		1		
	Fibroma of abdominal wall				1	1	1			
	Fibroma of breast				2	2	2			
	Ganglion				2	2	2			
	Gumma (supraorbital)			1		1	1			
	Lipoma			2	4	6	5	1		
	Mixed tumor of parotid				1	1		1		
	Submucous fibroid				2	2	2			
	Urethral caruncle				1	1	1			
Ulcer	Anal ulcers			2	1	3	2	1		
Veins	Varicose veins of leg			1		1		1		
Exenteration	Ruptured eyeball				1	1		1		
	Sarcoma of myroid			1		1				1
Extraction	Cataract			3	1	4	1	3		
Bullet	Bullet in knee			1		1	1			
	Bullet in shoulder			1		1	1			
Teeth	Alveolar abscess				2	2	1	1		
	Decayed teeth			1	2	3		3		
	Epilepsy				1	1		1		

Operations and results, all patients—Continued.

Operation.	Diagnosis.	White.		Colored.		Total.	Recovered.	Improved.	Unimproved.	Died.
		Male.	Female.	Male.	Female.					
Forceps delivery	Dry labor				2	2	2			
	Eclampsia				2	2	1			1
	Right occiput posterior				1	1	1			
Freeing adhesions	Chanchroid with adhesions			1		1		1		
	Old burn of axilla			1		1		1		
Hemorrhoidectomy	Hemorrhoids:									
	External			9	3	12	12			
	Internal	1		3	5	9	8	1		
	Mixed			3	2	5	5			
Hernioplasty	Hernia:									
	Inguinal (direct)	1		3	1	5	5			
	Inguinal (indirect)	4		54	14	72	63	7		2
	Femoral			1	1	2	2			
	Umbilical			3	2	5	4	1		
	Ventral				5	5	4			1
Incision and curettement.	Cervical adenitis			1		1		1		
	Empyema antrum of Highmore			2		2				1
	Fistula in ano			1	2	3	1	2		
	Inguinal adenitis			1		1		1		
	Osteomyelitis			2		2	1	1		
	Prepatellar bursitis			1		1	1			
Incision and drain	Abscess:									
	Abdominal wall			1		1	1			
	Alveolar				3	3	1	1		1
	Appendiceal			1	4	5	4			1
	Arm			1		1		1		
	Breast				1	1		1		
	Ear (posterior)				1	1		1		
	Ischiorectal			1	5	6	4	2		
	Perineal			1		1		1		
	Periurethral			3		3	2	1		
	Popliteal space			2		2		2		
	Psoas			1		1		1		
	Scrotal			1		1		1		
	Spermatic cord			1		1		1		
	Sternum			1		1		1		
	Subungual			1		1		1		
	Thigh				1	1				1
	Adenitis:									
	Axillary				1	1		1		
	Inguinal			5	2	7	4	3		
	Periauricular				1	1		1		
	Cellulitis:									
	Arm				2	2	1			1
	Foot				2	2	1			1
	Hand			4	2	6	1	5		
	Head			1		1				1
	Leg				1	1	1			
	Empyema				1	1		1		
	Hematoma of scalp			1		1		1		
	Osteomyelitis				1	1				1
	Peritonitis			2	1	3	1	1		1
	Phlegmon of scrotum			3		3		1		2
	Post-operative wound				1	1	1			
	Ranula				1	1	1			
	Sebaceous cyst				1	1		1		
	Sinusitis (frontal)			2		2		2		
	Sinusitis (maxillary)			1		1				1
Insertion of bone peg	Ununited fracture of femur				1	1		1		
	Ununited fracture of tibia				1	1		1		
Insertion of pessary	Anteflexion of uterus				1	1	1			
Iridectomy	Glaucoma			2		2		1		
	Iridocyclitis			1		1			1	
	Prolapsed iris			1		1	1			
Laminectomy	Gunshot wound of spinal cord			1		1				1
Lateral incision	Chancroids			1		1		1		
	Chanchroidal phimosis			10		10	1	9		
	Phimosis			1		1	1			
Ligation	Varicocele			2		2	1	1		
Exterior carotid artery.	Carcinoma of tongue			1		1		1		
Femoral vein	Gangrene of foot				1	1				1
Saphenous vein	Varicose veins				1	1	1			
Manipulation	Ankylosis:									
	Hand			1	2	3		3		
	Knee				2	2		2		
Mastoidectomy	Mastoiditis			6		1		1		

Operations and results, all patients—Continued.

Operation.	Diagnosis.	White. Male.	White. Female.	Colored. Male.	Colored. Female.	Total.	Recovered.	Improved.	Unimproved.	Died.
Manipulation and cast.	Ankylosis:									
	Knee joint	....	....	......	6	6	2	4	....	....
	Shoulder joint	....	....	1	1	2	......	2	....	....
	Sacro-iliac subluxation	....	....	3	1	4	2	2	....	....
Nephrectomy	Renal tuberculosis	....	....	1	......	1	1	......	....	....
Nephrorrhaphy	Floating kidney	....	....	......	3	3	2	1	....	....
Nephrotomy	Traumatic hematuria	....	....	1	......	1	1	......	....	....
Orchidectomy	Gangrenous testicle (traumatic)	....	....	1	......	1	1	......	....	....
	Undescended testicle	....	....	1	......	1	1	......	....	....
Osteotomy	Empyema frontal sinus	....	....	1	......	1	1	......	....	....
	Genu varum	....	....	2	......	2	2	......	....	....
	Hallux valgus	....	....	......	1	1	1	......	....	....
	Osteomyelitis of tibia	....	....	1	......	1	1	......	....	....
Osteotomy and curettage.	.....do	....	....	2	......	2	......	2	....	....
Perineal section	Perineal abscess	....	....	3	......	3	1	1	....	1
	Perineal fistula	....	....	1	......	1	1	......	....	....
	Perineo-scrotal fistula	....	....	1	......	1	......	1	....	....
	Recto-vesical fistula	....	....	1	......	1	......	1	....	....
	Stricture of uretha	....	....	1	......	1	......	......	....	1
Perineorrhaphy	Lacerated perineum	....	....	......	30	30	27	3	....	....
Plastic	Fecal fistulæ	....	....	2	......	2	......	1	....	1
Eye	Congenital ptosis	....	....	......	3	3	......	3	....	....
	Entropsion	....	....	1	......	1	......	1	....	....
	Post-operative wound	....	....	1	......	1	......	1	....	....
Hand	Urethro-cervical fistula	....	....	......	1	1	1	......	....	....
Plaster cast	Fracture of humerus	....	....	1	......	1	......	1	....	....
	Fracture of tibia	....	....	1	......	1	1	......	....	....
	Tuberculosis:									
	Hip joint	....	....	1	4	5	......	5	....	....
	Hip and knee joint	....	....	......	1	1	......	1	....	....
	Vertebra	....	....	1	......	1	......	1	....	....
Podalic version	Face presentation	....	....	......	3	3	3	......	....	....
Posterior colpotomy	Pelvic abscess	....	....	......	2	2	......	2	....	....
	Ruptured ectopic	....	....	......	1	1	......	1	....	....
	Salpingitis	....	....	......	1	1	1	......	....	....
	Septic uterus	....	....	......	1	1	1	......	....	....
Prostatectomy	Hypertrophied prostate	....	....	5	......	5	4	......	....	1
Radical (amputation)	Carcinoma of breast	....	....	......	8	8	4	1	....	3
Reduction and fixation	Dislocation:									
	Carpal bones (wrist)	....	....	1	......	1	......	1	....	....
	Hip joint	....	....	......	2	2	......	1	....	1
	Shoulder joint	....	....	1	1	2	2	......	....	....
	Tibia, head of	....	....	......	1	1	......	1	....	....
	Ulna	....	....	3	......	3	......	3	....	....
	Vertebræ (cervical)	....	....	......	1	1	......	1	....	....
	Fracture:									
	Clavicle	....	....	1	......	1	......	1	....	....
	Colle's	....	....	......	1	1	1	......	....	....
	Femur	....	....	4	1	5	1	3	....	1
	Humerus	1	....	......	......	1	......	1	....	....
	Radius	....	....	1	1	2	1	1	....	....
	Tibia	....	....	1	......	1	......	1	....	....
	Tibia and fibula	....	....	1	......	1	1	......	....	....
Removal:										
Cartilage	Dislocated semilunar cartilage	....	....	......	1	1	1	......	....	....
Cyst	Parovarian cyst	....	....	......	1	1	1	......	....	....
Foreign body	Bullet in arm	....	....	1	......	1	1	......	....	....
	Needle in foot	....	....	1	......	1	1	......	....	....
	Needle in hand	....	....	......	1	1	1	......	....	....
Finger nail	Subungual abscess	....	....	1	......	1	1	......	....	....
	Paronychia	....	....	1	......	1	1	......	....	....
Sinus	Old sinus of iliac crest due to fracture.	....	....	1	......	1	......	1	....	....
Suture	Punctured wound of eye	....	....	......	1	1	......	1	....	....
Tumor	Submucous fibroid	....	....	......	4	4	4	......	....	....
Repair	Hernia of muscles of finger	....	....	1	......	1	1	......	....	....
	Gunshot wound of stomach	....	....	1	......	1	1	......	....	....
	Post-operative wound (abdominal).	....	....	......	1	1	1	......	....	....
	Chronic ulcer of foot	....	....	1	......	1	1	......	....	....
	Stab wound of chest involving pleura.	....	....	1	......	1	1	......	....	....
	Fecal fistulæ	....	....	1	......	1	......	1	....	....
	Vesico-vaginal fistula	....	....	......	2	2	......	2	....	....
	Recto-vesical fistula	....	....	1	......	1	......	1	....	....

Operations and results, all patients—Continued.

Operation.	Diagnosis.	White.		Colored.		Total.	Recovered.	Improved.	Unimproved.	Died.
		Male.	Female.	Male.	Female.					
Resection:										
Humerus (partial)	Compound fracture of humerus	....	....	....	1	1	....	....	....	1
Mandible (left half)	Sarcoma of mandible	....	....	1	....	1	....	1	....	....
Rib	Empyema	....	....	3	3	6	1	2	....	3
	Subdiaphragmatic abscess	....	....	1	....	1	....	....	....	1
	Tuberculosis of costo-sternal junction.	....	....	....	1	1	1	....	....	....
Tumor	Adenoma of rectum	....	....	1	....	1	....	1	....	....
Sequestrotomy	Osteomyelitis of tibia	....	....	....	2	2	2	....	....	....
Skin grafting	Burn of axilla	....	....	1	....	1	....	1	....	....
Stretching (nerve)	Sciatic neuritis	....	....	1	....	1	....	1	....	....
Suturing	Lacerated wounds:									
	Eyelid	....	....	....	1	1	1	....	....	....
	Foot	....	....	1	....	1	....	....	....	1
	Forearm	....	....	1	....	1	1	....	....	....
	Scrotum	....	....	1	....	1	1	....	....	....
	Rupture of operative wound	....	....	....	1	1	....	....	....	1
Thyroidectomy (partial).	Cystic goitre	....	....	....	2	2	2	....	....	....
Tonsillectomy	Exophthalmic goitre	....	....	2	3	5	4	....	....	1
Trachelorrhaphy	Hypertrophied faucial tonsils	1	2	106	132	241	200	41	....	....
Trephine	Lacerated cervix	....	....	....	12	12	12	....	....	....
Whiteheads	Glaucoma	....	....	1	....	1	....	1	....	....
Wiring of bone	Internal hemorrhoids	....	....	3	....	3	2	1	....	....
	Fracture:									
	Clavicle	....	....	1	....	1	....	1	....	....
	Mandible	....	....	3	....	3	....	3	....	....
	Pelvis	....	....	....	1	1	1	....	....	....
	Radius and ulna	....	....	1	....	1	....	1	....	....
	Tibia	....	....	1	....	1	....	1	....	....
	Tibia and fibula	....	....	....	2	2	....	2	....	....
	Ulna	....	....	1	....	1	....	....	1	....
Total		13	3	667	1,230	1,913	1,412	395	10	96

Obstetrical record, except pay patients.

Month.	White.		Colored.		Total.	Eclampsia.	Caesarean section.	Podalic version.	Lacerations.	Post-partum hemorrhage.	Stillbirths.	Twins.	Head.	Breech.	Face.	Forceps.	Primipara.	Multipara.
	Male.	Female.	Male.	Female.														
July	....	....	16	10	26	1	1	0	9	0	2	1	26	0	0	1	15	10
August	....	....	14	18	32	1	0	0	8	2	0	0	30	2	0	0	15	17
September	....	....	10	20	30	0	0	0	8	4	2	0	30	0	0	1	17	13
October	....	....	10	17	27	2	1	1	8	1	1	0	25	2	0	0	16	11
November	....	....	13	16	29	0	0	0	14	4	3	0	29	0	0	1	19	10
December	....	....	7	15	22	0	0	0	10	4	2	0	21	1	0	0	12	10
January	....	....	20	19	39	2	2	0	10	0	9	1	37	1	1	0	24	14
February	....	....	18	6	24	0	0	0	8	0	6	0	24	0	0	0	12	12
March	....	....	15	8	23	0	0	0	11	1	3	0	23	0	0	0	14	9
April	....	....	12	14	26	1	1	0	11	1	3	0	25	1	0	0	15	11
May	....	....	6	11	17	0	0	0	8	0	2	0	16	1	0	0	13	4
June	....	....	19	23	42	0	1	1	9	0	3	1	38	2	2	0	23	18
Total	....	....	160	177	337	7	6	2	114	17	36	3	324	10	3	3	195	139

Anesthetics, all patients.

	White.		Colored.		Total.
	Male.	Female.	Male.	Female.	
General:					
Chloroform				5	5
Chloroform and ether				1	1
Chloroform and cocaine				1	1
Ether	12	3	568	1,176	1,7[illegible]
Nitrous oxide and ether			1		1
Novocaine and ether			1		1
Local:					
Apothesine			1	5	6
Cocaine	1		84	30	115
Ethyl chloride			1	4	5
Novocaine			4	2	6
Total	13	3	660	1,224	1,[illegible]

Pathological and X-ray laboratories.

RADIOGRAPHS.

	1918	1917		1918	1917
Abdomens	51	162	Kidneys and ureters	21	[illegible]
Chests	136	184	Knees	48	34
Elbows	21	49	Shoulders	15	25
Feet and ankles	60	76	Spines	14	22
Femurs	12	35	Tibias	40	47
Forearms	34	16	Hands and wrists	60	64
Heads	51	116			
Hips and pelves	31	45	Total	611	[illegible]
Humeri	8	17			

PATHOLOGICAL LABORATORY.

	1918	1917		1918	1917
Red counts	69	72	Autopsies	14	26
White counts	284	247	Museum specimens	35	[illegible]
Hemoglobin estimate	33	91	Sputum examinations	93	75
Widal reactions	41	48	Urinalyses	1,384	1,[illegible]
Malarial examinations	6	8	Noguchi reactions	1,080	1,[illegible]

Total number positives, 304, or 28.1 per cent.
Total number negatives, 765, or 70.8 per cent.
Total number doubtful, 8, or 0.7 per cent.
Total number A. O., 3, or 0.4 per cent.

Three hundred and twelve of these (about one-third) came from the dispensary.

Numerous examinations of gastric contents, feces, bacteriological smears and cultures, differential counts, blood cultures, coopulation estimates, preparations of vaccines, spinal fluids, "red tests," and blood tupars not recorded were made and are not enumerated above.

X-RAY LABORATORIES.

Disease.	Cases.	Treatments.	Cured.	Improved.	Unimproved.	Unknown.
Inoperable carcinoma (breast)	1	6		1		
Keloids	7	32	3	2		2
Tuberculous adenitis	12	60	10			2
Scrofula derma	1	5		1		
Total	21	103	13	4		4

Nativities, except pay patients.

Nativities.	White.		Colored.		Nativities.	White.		Colored.	
	Male.	Female.	Male.	Female.		Male.	Female.	Male.	Female.
Alabama			16	6	New Jersey			1	10
Arkansas			4		New York		1	8	
Connecticut			1		North Carolina	1		60	49
Delaware			10		Ohio			2	1
District of Columbia	12	4	436	542	Pennsylvania		1		2
Florida			15	20	South Carolina				21
Georgia			20	24	Tennessee			8	9
Illinois			12		Texas			12	1
Indiana			1		Virginia	3		286	683
Kansas				2	West Virginia			4	22
Kentucky			14	4	British West Indies			2	
Louisiana			4	8	Cuba			2	
Maryland	6		326	341	Unknown			3	6
Mississippi				17					
Missouri			1	4	Total	22	6	1,248	1,772

Occupation, except pay patients.

Occupations.	White.		Colored.		Occupations.	White.		Colored.	
	Male.	Female.	Male.	Female.		Male.	Female.	Male.	Female.
Actor			2		Huckster			2	
Agent	2		10		Janitor			36	
Baker	5				Laborer			662	
Bellman			8		Laundress				86
Blacksmith			4		Machinist			1	
Butcher	1				Manicurist				2
Butler			15		Mechanic	1		1	
Carpenter	4		4		Minister			2	
Chauffeur	1		36		Musician			2	
Clerk	3		2		No occupation including births			259	198
Cook			6	22					
Domestic		2		843	Nuresemaid				16
Dressmaker				68	Orderly			1	
Driver			22		Physician			1	
Elevatorman			18		Porter			43	
Expressman	1		1		Soldier	1		2	
Farmer			3		Student	3		97	36
Hairdresser				3	Waiter			15	22
Hostler			1						
Housewife		4		467	Total	21	6	1,248	1,772
Housekeeper				3					

Nativities, pay patients, except births.

Nativities.	White.		Colored.		Nativities.	White.		Colored.	
	Male.	Female.	Male.	Female.		Male.	Female.	Male.	Female.
Alabama			1	4	Pennsylvania			1	
District of Columbia	4	2	41	91	South Carolina			4	14
Delaware				3	Tennessee			6	4
Florida				10	Texas			14	1
Georgia			4		Virginia			82	129
Maryland			12	63	West Virginia			13	6
Mississippi				1	Unknown		6	6	20
New York			1	8					
North Carolina			16	10	Total	4	8	201	366
Ohio				2					

Occupations, pay patients, except births.

Occupation.	White.		Colored.		Occupation.	White.		Colored.	
	Male.	Female.	Male.	Female.		Male.	Female.	Male.	Female.
Agent			12		Laborer	2		10	
Banker			1		Laundress				1
Barber			8		Maid				10
Bellman			1		Manicurist				2
Bricklayer			2		Mechanic	1		4	
Butler			4		Merchant			6	
Carpenter			6		Messenger			15	
Chauffeur			8		Nurse				12
Clerk			15		Physician			2	
Cook			6	6	Plasterer			4	
Copyist			4		Policeman			2	
Domestic				42	Porter			8	
Dressmaker				10	Preacher			2	
Dyer			1		Seamstress				3
Electrician			4		Student	1		6	5
Elevatorman			6		Teacher			14	18
Farmer			2		Valet	1			
Fireman			3		Waiter			4	
Hairdresser				2	Watchman			2	
Housekeeper				18	Unknown		6	35	6
Housemaid				11					
Housewife		2		220	Total	4	8	201	366
Janitor			4						

OUTDOOR SERVICE.

The following tables show the number of medical and surgical diseases treated in the outdoor service:

Medical and surgical diseases—Out-patient department.

Diagnosis.	White.		Colored.			Diagnosis.	White.		Colored.		
	Male.	Female.	Male.	Female.	Total.		Male.	Female.	Male.	Female.	Total.
Medical.						*Medical*—Continued.					
Adenitis			6	2	8	Gastralgia			4	3	7
Anemia			1	8	9	Gastritis:					
Aneurism			3		3	Acute			8	6	14
Aortic insufficiency			21	4	25	Chronic			16		..
Arthritis:						Gastroenteritis			13	15	28
Infection			10	5	15	Hemorrhoids			12	13	25
Gonorrheal			15	8	23	Hepatitis			11	8	19
Arteriosclerosis	1		20	5	26	Indigestion:					
Asthma, bronchial			30	14	44	Gastric			45	56	101
Auto-intoxication			11	9	20	Intestinal	2	1	30	35	68
Bronchitis:						Influenza	2	1	30	35	68
Acute	2	1	74	91	168	Lumbago			21	7	28
Chronic		1	30	11	42	Malaria			7	3	10
Cardiac hypertrophy			5	2	7	Migraine			11	15	26
Chlorosis				5	5	Mitral insufficiency			25	17	42
Coccygodynia				2	2	Myalgia	3	1	34	42	80
Constipation			10	38	48	Myocarditis			18	17	35
Coryza, acute			10	31	41	Myositis			11	11	22
Cystitis, acute			1	3	4	Neuralgia:					
Debility			4	1	5	Facial			10	15	25
Debility, senile			15	2	17	Intercostal			11	6	17
Diabetes			5	1	6	Nephritis:					
Empyema			3		3	Acute			7	5	12
Emphysema			1	3	4	Chronic			40	22	62
Endocarditis			3	1	4	Neurasthenia			15	21	36
Enuresis			3	5	8	Pharyngitis			30	15	45
Enteritis			6	14	20	Pleurodynia	2		13	11	26
Enteroptosis				4	4	Pleurisy			11	4	15

Medical and surgical diseases—Out-patient department—Continued.

Diagnosis.	White.		Colored.		Total.
	Male.	Female.	Male.	Female.	
Medical—Continued.					
Pneumonia:					
Bronchial			5	6	11
Lobar			9	5	14
Rheumatism:					
Acute			20	10	30
Chronic			15	13	28
Muscular			40	45	85
Tacchycardia			3	2	5
Tonsillitis			8	4	12
Tuberculosis, pulmonary			20	14	34
Typhoid			3	5	8
Undiagnosed			51	62	113
Total	10	4	866	791	1,671
Revisits					2,304
Minor surgery.					
Abscess:					
Cervical			8	3	11
Hand			10	2	12
Adenitis, cervical			8	2	10
Cellulitis:					
Arm			3	5	8
Hand			10	3	13
Neck			2	2	4
Cysts, sebaceous			15	7	22
Dislocations, shoulder			2		2
Fractures:					
Colle's			6	3	9
Forearm			2	1	3
Rib			3	1	4
Foreign body:					
Eye			5	6	11
Hand			18	20	38
Throat			2	5	7
Ganglion			5	1	6
Ingrowing toenail			2	3	5
Prepatellar bursa			2	1	3
Sprains:					
Arm			3	1	4
Ankle			6	4	10
Foot			3	2	5
Vaccinations	2	3	140	132	277
Total	2	3	255	204	464
Surgical dressings					2,145
Pediatrics.					
Adenoids	2	3	12	10	27
Adenitis, tuberculous			11	7	18
Auto-intoxication	3	4	14	17	38
Bronchitis:					
Acute	3	1	21	32	57
Chronic			12	16	28
Constipation			18	18	36
Croup, spasmodic			4	5	9
Cystitis			2	1	3
Dentition			8	11	19
Dermatitis			7	6	13
Diarrhea	1		32	41	74
Eczema		1	7	10	18
Enteritis			9	9	18
Enterocolitis			19	17	36
Herpes			5	6	11
Hernia:					
Inguinal			3	4	7
Umbilical			15	17	32
Gastritis			11	12	23
Gastroenteritis			15	15	30
Ileo-colitis			5	8	13
Intestinal worms			14	8	22
Laryngitis			4	5	9

Diagnosis.	White.		Colored.		Total.
	Male.	Female.	Male.	Female.	
Pediatrics—Continued.					
Lues, congenital			14	17	31
Marasmus:					
Luetic			7	6	13
Tuberculous			14	14	28
Otitis media			8	7	15
Ophthalmia			3	4	7
Pertussis			11	9	20
Pharyngitis			20	26	46
Phimosis			11		11
Pneumonia, bronchial			5	7	12
Rachitis			21	25	46
Rhinitis			8	6	14
Scabies			5	6	11
Stomatitis			10	15	25
Tonsillitis			0	37	67
Tuberculosis, pulmonary			3	2	5
Vaginitis				5	5
Vaccinations			5	21	36
Undiagnosed			1	34	55
Total	8	8	454	486	956
Revisits					530
Genitourinary.					
Abscess:					
Penis			3		3
Perineum			5		5
Scrotum			6		6
Adenitis, inguinal			94		94
Chancre			52		52
Chancroid			75		75
Condylomata			18		18
Epididymitis			40		40
Prostate gland, hypertrophy of			10		10
Prostatitis			7		7
Syphilis:					
Primary			15		15
Secondary			28		28
Tertiary			3		3
Stricture, urethral			35		35
Tuberculosis:					
Bladder			2		2
Kidney			2	2	4
Testicle			4		4
Urethritis:					
Anterior			130		130
Gonorrheal			97		97
Posterior			45		45
Total			671	2	673
Revisits					1,031
Gynecology.					
Abscess:					
Pelvic				5	5
Vulvo vaginal				16	16
Inguinal				12	12
Abortion, spontaneous				25	25
Adenitis, inguinal				27	27
Adhesions, postoperative				10	10
Amenorrhea				15	15
Caruncle, urethral				3	3
Cervicitis				8	8
Chancroid				14	14
Condylomata				15	15
Cysts, ovarian				10	10
Cystitis				22	22
Cystocele				27	27
Dysmenorrhea				70	70
Endometritis				25	25
Fibroid of uterus				21	21

Medical and surgical diseases—Out-patient department—Continued.

Diagnosis.	White.		Colored.		Total.
	Male.	Female.	Male.	Female.	
Gynecology—Continued.					
Gonorrhea	....	....	....	35	35
Lacerations:					
Cervix	....	....	....	55	55
Perineum	....	....	....	72	72
Leucorrhea	....	....	....	45	45
Lues	....	....	....	10	10
Menopause	....	....	....	25	25
Menorrhagia	....	....	....	18	18
Miscarriage	....	....	....	4	4
Ovaritis	....	....	....	34	34
Pregnancy	....	....	....	105	106
Salpingitis	....	....	....	59	59
Urethritis	....	....	....	16	16
Uterine displacements:					
Antiversion	....	....	....	10	10
Prolapse	....	....	....	18	18
Retroversion	....	....	....	40	40
Uterine subinvolution	....	....	....	15	15
Vaginitis	....	....	....	20	20
Undiagnosed	....	....	....	35	35
Total	....	....	....	937	937
Revisits	....	....	....	....	1,238
Ear, nose, and throat.					
Abscess:					
Antrum	....	....	1	....	1
Peritonsillar	1	....	20	10	31
Sublingual	....	....	1	1	2
Adenoids	1	....	35	41	77
Cerumen, impaction of	....	....	4	5	0
Eczema, ear	....	....	5	1	6
Ethmoiditis	....	....	1	1	2
Epistaxis	....	....	11	5	16
Eustachian salpingitis	....	1	15	8	23
Foreign body:					
Ear	....	....	5	1	6
Nose	....	....	11	....	11
Throat	....	....	5	2	7
Furuncle, ear	....	....	3	2	5
Gumma of palate	....	....	7	6	13
Laryngitis:					
Acute	....	....	37	38	75
Chronic	....	....	40	18	58
Specific	....	....	10	9	19
Lingual varix	....	....	3	....	3
Nasopharyngitis	1	....	18	17	36
Nasal septum, deflection of	....	....	3	1	4
Otalgia	....	1	3	4	8
Otitis, externa	....	....	5	8	13
Otitis, media:					
Acute	....	....	11	14	25
Chronic	....	....	21	27	48
Pharyngitis:					
Acute	2	1	29	37	69
Chronic	....	....	19	21	40
Specific	....	....	22	14	36
Rhinitis:					
Acute	1	....	7	8	16
Atrophic	....	....	3	5	8
Hypertrophic	....	....	5	10	15
Luetic	....	....	12	20	32
Tonsillitis:					
Acute	....	1	54	60	115
Chronic	....	....	22	30	52
Follicular	....	....	18	35	53
Tonsils, hypertrophy of:					
Faucial	....	....	130	140	270
Lingual	....	....	5	6	11
Ear, nose, and throat—Con.					
Turbinate bones, hypertrophy of	....	....	12	16	28
Uvulitis	....	....	10	15	25
Undiagnosed	....	....	55	62	......
Total	6	4	678	698	1,386
Revisits	....	....	....	....	915
Neurology.					
Bell's palsy	....	....	3	4	7
Chorea	....	....	....	9	9
Embolism, cerebral	....	....	3	4	7
Epilepsy	....	....	4	8	12
Hystero-epilepsy	....	....	4	4	8
Hemorrhage, cerebral	....	....	9	6	14
Hysteria	....	....	2	8	10
Neuralgia	1	....	25	18	34
Neurasthenia	....	1	9	5	15
Neuroses, occupational	....	....	7	7	14
Neuritis	....	1	10	12	23
Paraplegia, spastic	....	....	4	....	4
Sciatica	1	....	6	7	14
Syphilis:					
Cerebral	....	....	2	1	3
Spinal	....	....	4	5	9
Tabes, dorsalis	....	....	11	5	16
Undiagnosed	....	....	15	9	......
Total	2	2	118	112	234
Revisits	....	....	....	....	230
Orthopedic.					
Ankylosis:					
Elbow	....	....	....	1	1
Hip	....	....	3	....	3
Arthritis:					
Gonorrheal	....	....	6	6	12
Hypertrophic	....	....	....	3	3
Infectious	....	....	7	5	12
Villous	....	....	1	2	3
Bursitis, subacromial	....	....	6	....	6
Contractures:					
Ankle	....	....	2	1	3
Knee	....	....	1	3	4
Wrist	....	....	2	....	2
Fractures:					
Humerus	....	....	2	....	2
Tibia	....	....	2	....	2
Dislocations, semilunar cartilage	....	....	1	1	2
Genu valgum	....	....	4	4	8
Genu varum	....	....	6	6	12
Myositis	....	....	1	4	5
Osteo-myelitis	....	....	....	2	2
Paralysis	....	....	....	1	1
Periostitis:					
Specific	....	....	1	1	2
Traumatic	....	....	....	1	1
Pes planus	....	....	16	14	30
Poliomyelitis, anterior	....	....	2	1	3
Sacro-iliac relaxation	....	....	16	8	24
Scoliosis	....	....	1	3	4
Sprains:					
Ankle	....	....	3	4	7
Back	....	....	3	1	4
Knee	....	....	1	1	2
Wrist	....	....	1	....	1
Spine	....	....	4	....	4
Undiagnosed	....	....	15	18	33
Total	....	....	126	101	227
Revisits	....	....	....	....	300

Medical and surgical diseases—Out-patient department—Continued.

Diagnosis.	White.		Colored.		Total.
	Male.	Female.	Male.	Female.	
Eye.					
Amblyopia	....	....	4	3	7
Angio sclerosis	....	....	1	3	4
Aphakia	....	....	2	5	7
Arterio sclerosis	....	....	7	9	16
Atrophy, optic	....	....	6	2	8
Astigmatism:					
Hyperopic	....	....	22	33	55
Myopic	....	....	7	8	15
Blepharitis	....	....	5	14	19
Cataract	....	....	12	21	42
Chalazion	....	....	25	18	43
Circumcorneal opacity	....	....	5	4	9
Choroiditis	....	....	5	15	20
Choroido-retinitis	....	....	16	12	28
Choroido-iritis	....	....	4	4	8
Conjunctivitis:					
Catarrhal	....	....	11	10	21
Follicular	....	....	15	18	33
Phlyctenular	....	....	13	15	28
Purulent	....	....	8	8	16
Corneal ulcer	....	....	8	10	18
Ecchymosis, conjunctivival	....	....	5	6	11
Eczema of lids	....	....	2	4	6
Foreign body in eye	....	....	10	17	27
Glaucoma	....	....	2	7	9
Hordeolum	....	....	7	8	15
Iritis	....	....	11	31	42
Keratitis	....	....	9	14	23
Keratitis phlyctenular	....	....	4	5	9
Kerato-iritis	....	....	3	7	10
Leucoma	....	....	....	5	5
Myopia	....	....	5	7	12
Nebula of cornea	....	....	1	....	1
Neuro-retinitis	....	....	29	31	60
Optic neuritis	....	....	1	4	5
Ophthalmia, gonorrheal	....	....	5	6	11
Pinguecula	....	....	....	1	1
Presbyopia	....	....	14	6	20
Pterygium	....	....	1	5	6
Refraction	1	5	102	141	249
Strabismus	....	....	6	8	14
Trauma of eye	....	....	9	2	11
Vernal catarrh	....	....	6	19	25
Undiagnosed	....	....	40	51	91
Total	1	5	448	507	1,061
Revisits	....	....	....	....	2,107

Diagnosis.	White.		Colored.		Total.
	Male.	Female.	Male.	Female.	
Dermatology.					
Abrasions	....	....	5	2	7
Acne	....	....	12	15	27
Acne vulgaris	....	....	22	19	41
Adenitis, cervical	....	....	5	6	11
Alopecia, areata	....	....	3	5	8
Condylomata	....	....	5	6	11
Dermatitis:					
Calorica	....	....	6	5	11
Medicamentos	....	....	8	4	12
Venenata	....	1	5	6	12
Ecthyma	....	....	2	....	2
Erythema	....	....	2	5	7
Furunculosis	....	....	1	2	3
Herpes	2	1	6	9	18
Herpes zoster	....	1	....	3	4
Impetigo	....	....	6	7	13
Impetigo, contagiosa	....	....	7	6	13
Keratosis, pigmentary	....	....	1	1	2
Lentigo	....	1	....	15	16
Leucoderma	....	....	5	4	9
Lichen planus	....	....	3	2	5
Lupus	....	....	1	5	6
Pediculosis capiti	1	....	3	5	9
Pediculosis corpori	....	....	6	....	6
Pernio	....	....	5	....	5
Pityriasis facei	....	....	4	5	9
Scabies	....	....	25	28	53
Pruritis	....	....	9	8	17
Seborrhea	....	....	5	1	6
Syphilis, secondary	....	....	54	26	80
Tinea	....	....	15	14	29
Tinea tonsurans	....	....	15	....	15
Urticaria	....	1	19	11	31
Varicella	....	....	6	7	13
Verucca	....	....	3	4	7
Undiagnosed	....	....	25	30	55
Total	3	5	299	266	573
Revisits	....	....	....	....	374
Tuberculosis.					
Pulmonary tuberculosis	....	....	37	45	82
Total	....	....	37	45	82
Revisits	....	....	....	....	118

Statistical summary.

	1918					1917				
	White.		Colored.		Total.	White.		Colored.		Total.
	Male.	Female.	Male.	Female.		Male.	Female.	Male.	Female.	
In hospital, July 1, 1916	....	....	.....	.....	....	2	2	83	128	215
In hospital, July 1, 1917:										
Pay patients	....	....	3	13	16	....	....	.....	.....	....
Indigent—										
United States	1	1	60	84	146	....	....	.....	.....	....
District of Columbia	....	....	25	57	82	....	....	.....	.....	....
Total	1	1	88	154	244	2	2	83	128	215

Statistical summary, all patients—Continued.

	1918					1917				
	White.		Colored.			White.		Colored.		
	Male.	Female.	Male.	Female.	Total.	Male.	Female.	Male.	Female.	Total.
Admitted:										
Pay patients	4	2	191	366	563	6	3	112	218	339
Pay patients, births			22	24	46			12	24	36
Indigent—										
United States	8	2	477	673	1,160	18	6	644	854	1,522
District of Columbia	14	2	630	932	1,578	27	3	660	975	1,665
Births—										
United States			71	91	162			70	91	161
District of Columbia			70	69	139			83	80	163
Total admitted	26	6	1,461	2,155	3,648	51	12	1,581	2,242	3,886
Total under care, indoor	27	7	1,549	2,309	3,892	53	14	1,664	2,370	4,101
Stillbirths:										
Pay patients				2	2			1		1
Indigent			19	17	36			16	11	27
Total			19	19	38			17	11	28
Deaths:										
Pay patients			15	25	40		1	9	19	29
Indigent	1		156	157	314	2		145	136	283
Total	1		171	182	354	2	1	154	155	312
Discharged, including births:										
Pay patients—										
Recovered					312					207
Improved					151					98
Unimproved					29					13
Not treated					55					23
Total					547					341
Indigent—										
Recovered					1,637					[illegible]
Improved					902					[illegible]
Unimproved					223					[illegible]
Not treated					11					7
Total					2,773					[illegible]
Grand total discharged					3,674					[illegible]
In hospital, July 1, 1918:										
Pay patients			10	28	38			3	13	16
Indigent—										
United States			37	41	78	1	1	60	86	147
District of Columbia			46	56	102			25	57	82
Total indigent			83	97	180	1	1	85	142	229
Grand total remaining			93	125	218	1	1	88	155	245
Days, maintenance:										
Pay patients					7,655					5,348
Indigent—										
United States					35,572					[illegible]
District of Columbia					39,951					[illegible]
Officers and employees					38,978					[illegible]
Total					122,156					[illegible]
Cost of patients per day					$1.36					$1.216
Largest number of indigent patients at any one time					242					264
Smallest number of indigent patients at any one time					171					173
Daily average number of patients, pay and indigent					227.8					222.1
Number admitted from the District of Columbia, including births, indigent					1,717					[illegible]
Number admitted from the United States, including births, indigent					1,322					[illegible]
Number of prescriptions compounded:										
Indoor					26,274					[illegible]
Outdoor					8,095					[illegible]

FINANCIAL STATEMENTS.

BOARD OF CHARITIES ACCOUNT.

July 1, 1917, to June 30, 1918.

	Adults.	Children.	Babies.	Total.
In hospital July 1, 1917	67	11	4	82
Admitted	1,396	185	136	1,717
Total	1,463	196	140	1,799

Appropriation	$35,000
Bills rendered	35,000

ALLOTMENT OF APPROPRIATION FOR SALARIES.

[Under requirement of act of Congress approved June 25, 1909 (35 Stat., 992.)]

	Per annum.		Per annum.
Surgeon in chief	$3,000	Seamstress	$300
Assistant surgeon	1,500	Nurses (48 at $60)	2,880
Resident physician	1,200	Orderlies (2 at $300)	600
Pathologist	2,000	Orderlies (4 at $240)	960
Anæsthetist	1,200	Night orderly	276
Clerk	1,400	Maids (3 at $168)	504
Assistant clerk (1)	700	Head cook	540
Assistant clerk (1)	636	Second cook	360
Pharmacist	720	Third cook	288
Assistant pharmacist	120	Waiters (3 at $156)	468
Steward	720	Driver	408
Superintendent of nurses	1,080	Driver	360
Assistant superintendent of nurses	600	Laundryman	420
Night supervisor of nurses	480	Laundresses (5 at $156)	780
Head nurses (2 at $480)	960	Laborer	240
Engineer	1,200	Laborer	204
Assistant engineer	1,000	Laborer	216
Assistant engineer	900	Laborers (2 at $180)	360
Plumber	900		
Firemen (3 at $720)	2,160	Total	32,640

RECEIPTS AND DISBURSEMENTS.

RECEIPTS.

Appropriation, sundry civil act:		
For support	$30,000.00	
Salaries	32,640.00	
		$62,640.00
Appropriation, urgent deficiency act		5,448.00
Appropriation, District of Columbia (under contract with Board of Charities)		35,000.00
Pay patients		11,455.35
Total		114,543.35

DISBURSEMENTS.

			Unexpended balances.
Miscellaneous:			
Fuel, light, clothing, forage, medicine, etc	$32,874.91		$125.09
Urgent deficiency act	5,212.08		235.92
Pay patients	1,845.88		107.15
Subsistence	31,834.59		165.41
Pay patients	6,228.33		....
Salaries	32,184.93		455.07
Pay patients	2,803.94		....
Refunds, pay patients	470.05		....
		113,454.71	
Total unexpended balance		1,088.64	1,088.64

Miscellaneous expenditures.

Class No.		1918	1917
1	Stationery and drafting supplies	$492.34	$400.00
2	Hardware and metals:		
	Hardware	764.48	333.31
	Metals	24.90	60.82
3	Dry goods and wearing apparel, cordage	2,257.96	2,172.02
4	Drugs and medicines:		
	Chemicals and reagents	3,132.65	3,886.97
	Wines and whisky	97.63	87.24
5	Laboratory, hospital appliances, surgical instruments, etc.:		
	Laboratory	234.12	545.06
	Hospital appliances	1,877.55.	2,710.72
	Surgical instruments	1,400.59	530.85
6	Electrical, engineering, and plumbing supplies	544.07	647.56
7	Lumber, millwork, and building material	59.50	26.10
8	Paints, oils, brushes, etc.:		
	Brushes	7.22	37.96
	Oils, paints, and painters' supplies	328.86	262.98
10	Household supplies:		
	Cleaning	243.45	258.53
	Laundry	1,680.29	769.60
	Miscellaneous	797.60	420.30
11	Forage and seed	$331.60	$271.54
12	Photographic supplies	181.50	95.90
14	Fuel:		
	Charcoal	10.36	12.82
	Coal, anthracite	226.70	223.72
	Coal, bituminous	20,391.29	14,168.60
	Wood	15.00	45.00
15	Incandescent electric lamps	139.68	52.14
20	Telephone service	451.14	471.20
	Heat, light, and power service:		
	Gas	893.14	962.30
	Hauling ashes	479.19	502.25
	Telegrams	2.52	5.91
	Books and periodicals	46.96	45.75
	Sundries (unclassified miscellaneous)	116.83	965.25
	Repairs and construction:		
	Buildings	698.10	545.23
	Heating plant	578.60	....
	Instruments	107.75	127.70
	Kitchen utensils	47.66	54.85
	Laboratory	200.50	....
	Laundry	166.55	4.75
	Office	4.60	9.14
	Stable and ambulance	811.22	239.30
	Miscellaneous	88.71	158.25
	Total	39,952.87	32,131.12

Subsistence expenditures.

Class No.		1918	1917
10	Beverages:		
	Chocolate	$7.68	$5.20
	Cocoa	77.51	53.74
	Coffee	279.96	726.83
	Tea	194.55	175.00
	Canned goods	1,190.80	1,390.24
	Condiments and flavors	88.96	222.55
	Cereal food products:		
	Corn flakes	82.10	81.00
	Cornstarch	17.40	9.71
	Barley	12.00	5.98
	Bread	3,153.40	1,594.26
	Crackers	115.26	233.53
	Farina	47.74	....
	Flour	382.70	292.06
	Gelatine	80.00	....
	Hominy	29.73	27.60
	Macaroni	32.15	19.17
	Meal	81.80	39.96
	Oats, rolled	77.62	31.59
	Rice	102.46	59.22
	Spaghetti	26.70	13.41
	Tapioca	38.08	7.96
	Vermicelli	1.49	....
	Unclassified	583.47	166.29
	Dairy products:		
	Butter	4,126.70	4,223.37
	Buttermilk	154.68	121.06
	Cheese	26.58	20.81
	Cream	113.20	92.84
	Milk, fresh	4,016.24	2,850.62
	Eggs	2,102.90	1,753.82
	Fish:		
	Salt	....	42.00
	Clam bouillon	10.96	18.26
	Cod	157.45	85.68
	Fresh	1,090.74	586.04
10	Fish:		
	Salmon	$85.40	$34.00
	Oysters	....	154.00
	Fowls:		
	Chicken	3,003.75	2,102.90
	Turkey	65.00	63.00
	Fruits	531.50	120.30
	Ice	385.40	661.61
	Lard, pure hog	176.53	207.66
	Crisco	177.76	....
	Meats:		
	Bacon—		
	Breakfast	813.56	396.90
	Shoulder	751.09	452.34
	Beef—		
	Fresh	3,426.95	2,786.14
	Corned	209.77	154.36
	Chipped	217.58	212.66
	Soup shanks	196.16	218.66
	Ham, smoked	582.25	445.77
	Lamb	2,245.72	1,128.48
	Liver	187.24	131.56
	Pork, fresh	250.76	208.36
	Sausage—		
	Fresh	28.69	....
	Smoked	18.19	111.25
	Veal	258.41	261.94
	Saccharine products:		
	Molasses	21.00	6.90
	Sugar—		
	Granulated	1,867.89	1,846.72
	Powdered	5.10	5.25
	Syrup	41.25	23.25
	Salt	18.15	25.60
	Soft drinks, ginger ale	10.20	75.11
	Vegetables	3,986.65	4,368.22
	Total	38,062.92	30,770.60

Receipts and expenditures on account of pay patients.

	1918	1917
Receipts:		
Private room patients, at $1.25 per day	$7,163.75	$5,503.75
Ward patients, at $1.10 per day	2,676.30	561.00
Children, at 65 cents per day	282.70	173.55
Babies, at 40 cents per day	227.60	163.60
Operations	926.00	807.00
X-ray photos	221.00	136.00
Obstetrical cases	....	25.00
Examination of urine	3.00	....
Examination of blood	5.00	13.00
	11,455.35	7,382.90
Expenditures:		
Extra services (nurses, orderlies, maids)	2,803.94	2,275.16
Subsistence	6,228.33	2,691.48
Medical and surgical supplies	371.34	534.54
Miscellaneous (dry goods, repairs and improvements)	1,474.54	1,544.86
Refund of overpayment by patients	470.05	311.25
	11,348.20	7,357.29
Unexpended balance	107.15	25.61

NEEDS.

There are several important items considered necessary for the full development of the hospital which have been urged in previous annual reports. These needs still exist, but it would seem that the necessities of war make it proper not to press these claims very strongly at this time. Therefore, the items concerning the repairs of the buildings and salaries are the only ones urged at present. It is of the highest importance that the hospital be kept in a proper state of repair, for which purpose $5,000 is needed.

The problem of labor, too, is becoming more serious daily. Better pay is being offered by all other institutions, which fact places the hospital at a decided disadvantage. As a result, employees leave, frequently without notice, when higher salaries are in sight. It is urged, therefore, that the salaries all along the line be increased, so that the hospital can compete with other institutions in the labor market; $9,420 will be necessary to meet this situation.

TRAINING SCHOOL FOR NURSES.

The training school for nurses at present provides a course of three years and requires a high-school education as an essential for entrance. There are 48 pupil nurses in training, not enough for a hospital of this size, making an eight-hour shift impossible, thus endangering the health of the nurses, and reducing the efficiency of the force.

Special instructions in dietetics at Howard University were continued during the year; also a course on public-health nursing was given by the District of Columbia League of Nursing Education at the central registry. Five of the nurses who attended the lectures on public health last year were given two months' practical experience with the Instructive Visiting Nurse Society of this city. One nurse, after completing her training, was appointed to the regular staff of the I. V. N. S.

Very respectfully,

W. A. Warfield,
Surgeon in Chief.

The Secretary of the Interior.

The graduating exercises were held May 8, 1918, in the Andrew Rankin Memorial Chapel, eight nurses graduating, making a total of 306 holding certificates from the school.

Graduates, 1918.

Susie Coulbourne, Darby, Pa.
Marion Garbon, Summerville, S. C.
Nellie Harris, Philadelphia, Pa.
Pearl M. Smith, Painesville, Ohio.
Callie McGuinn Starks, Phoebus, Va.
Josephine Strothers, Abington, Va.
Ruth Turnquest, Jamaica, British West Indies.
Pearl Wallace, Concord, N. C.

Lectures.

The course of lectures was delivered by the following staff:

Diseases of children	Wm. J. French, M. D.
Gynecology	J. E. H. Taylor, M. D.
Anatomy and physiology	S. L. Carson, M. D.
Hygiene	C. A. Brooks, M. D.
Theoretical nursing	Laura R. MacHale.
Practical and theoretical nursing	Emma M. Irwin.
Diseases of the eye	M. O. Dumas, M. D.
Medical nursing	Caryl Burbank, M. D.
Obstetrics	E. D. Williston, M. D.
Materia medica and therapeutics	John W. Mitchell, M. D.
Urinalysis and bacteriology	B. Price Hurst, M. D.
Neurology	Evelyn Mitchell, M. D.
Ear, nose, and throat	M. O. Dumas, M. D.
Surgical nursing	William A. Jack, M. D.
Dietetics	

Applications, resignations, dismissals, etc.

Applications received during the year	155
Applicants taken on probation	21
Accepted after probation	18
Not accepted after probation	1
Resigned	8
Still on probation	5

Nursing staff.

Superintendent of nurses	1
Assistant superintendent of nurses	1
Graduate head nurses	3
Night supervisor of nurses	1
Graduates of class of 1918 still in hospital	7
Senior pupil nurses	17
Intermediate pupil nurses	6
Junior pupil nurses	12
Probationers	14

Course in cooking, theoretical and practical.

THEORY.	PRACTICAL WORK.
1. Water food	Coffee, tea, barley water, lemonade.
2. Carbohydrates—starch	Gruels, toast, Zwieback.
3. Carbohydrates—cellulose	Cereals and vegetables.
4. Carbohydrates—sugar	Fruits, sirups, jelly.
5. Fats and oils—salads	Salads, salad dressing, butter, cream.
6. Proteids—milk	Pasteurized, peptonized, koumiss.
7. Proteids—eggs	Cooked in shell, poached, omelets.
8. Proteids—milk and eggs	Custards, eggnogs, egg lemonade.
9. Proteids—meat and fish	Broiling, roasting, meat sandwiches.
10. Proteids—meat	Beef juice, beef extract, broth.
11. Proteids—gelatin	Chicken jelly, veal jelly, beef jelly.
12. Review carbohydrates	Sponge cake, ice cream, water ices.

Three-year schedule.

Ward.	Day duty.	Night duty.
SURGICAL EXPERIENCE.	*Months.*	*Months.*
Male	2	1
Female	2	1
Genito-urinary	1	1
Gynecological	4	2
Orthopedic	1	1
Emergency operating room	1	1
Main operating room	3	....
Obstetrical	2	1
MEDICAL EXPERIENCE.		
Male	3	1
Female	3	1
Children	2	1
Diet kitchen	1	....
Total	25	11

Occupation and residence of graduates.

1896.

Ashton, Luci V. (Mrs. Woods), Kansas City, Mo.

Blackburn, N. L., private nurse, Philadelphia, Pa.

Burke, Julia (Mrs. Phillips), Jacksonville, Fla.

Fleetwood, Sara I., deceased.

Foust, Isabella L., private nurse, Winston, N. C.

Gibson, Katherine C., Bureau of Engraving and Printing, Washington, D. C.

Green, Anna N., deceased.

Owens, Laura A., private nurse, Washington, D. C.

Pierce, Letitia (Mrs. Blair), Washington, D. C.

Ricks, Antoinette M. (Mrs. Demby), Kansas City, Mo.

Robinson, Annie B., superintendent and matron, Good Samaritan Hospital, Charlotte, N. C.

Shorter, Sarah A., private nurse, Washington, D. C.

Simms, Annie A. (Mrs. Johnson), Baltimore, Md.

Smith, Gertrude (Mrs. Thorn), Washington, D. C.

Tyler, Elizabeth, district nursing, New York City.

1897.

Caldwell, Amanda J. (Mrs. Darrell), Dallas, Tex.

Combs, Annie, massage specialist, Washington, D. C.

Green, Lucille (Mrs. Tibbs), St. Paul, Minn.

Griffin, G. Josephine, private nurse, Washington, D. C.

1897—Continued.

Haithcock, Ada, private nurse, Washington, D. C.

King, Annie C. (Mrs. Hughes), Richmond, Va.

Rollins, Willie M. (Mrs. Frazier), Washington, D. C.

Smith, S. May, private nurse, Troy, N. Y.

Thomas, Annie M., private nurse, Washington, D. C.

Thompson, Della R. (Mrs. Davis), Vienna, Va.

Underhill, Katherine P. (Mrs. Wm. Moten), Washington, D. C.

Webb, Eva, private nurse, Washington, D. C.

Warner, Florence A., private nurse, Springfield, Mass.

Young, Lola E. M., private nurse, Greenville, S. C.

1898.

Bannister, Carrie J. (Mrs. Knox), Washington, D. C.

Bennett, Florence R., private nurse, Baltimore, Md.

Cabannis, Martha E., night supervisor, Freedmen's Hospital, Washington, D. C.

Carter, Edith M., private nurse, New Rochelle, N. Y.

Davis, Annie M., private nurse, Shelbyville, Tenn.

Ennis, Sarah J. (Mrs. Brooks), Washington, D. C.

Gaines, Mary R., private nurse, Berkeley, Cal.

Geder, Isabella, private nurse, Binghamton, N. Y.

Occupation and residence of graduates—Continued.

1898—Continued.

Hurlong, Mary A., private nurse, Asheville, N. C.
King, Carrie M. (Mrs. Foreman), Washington, D. C.
Robinson, Amelia A., private nurse, Nashville, Tenn.
Russell, Ruby E., private nurse, Charlottesville, Va.
Stanton, Priscella (Mrs. Todd), Pittsburgh, Pa.
Sumby, Lillie May, private nurse, Washington, D. C.
Valentine, J. Ella, private nurse, Lebanon, Ind.
Whitson, Clara E. (Mrs. Howe), Washington, D. C.

1899.

Banks, Effie P. (Mrs. Sykes), Indianapolis, Ind.
Brown, Agnes M., private nurse, Meyersdale, Pa.
Coleman, Georgia A., private nurse, Washington, D. C.
Dismond, S. Matthew (Mrs. Dibble), St. Louis, Mo.
Francis, Bertha A., head nurse, Home Hospital, Birmingham, Ala.
Hairston, Lula C. (Mrs. Crews), Winston, N. C.
Hankins, Mintha C., private nurse, Washington, D. C.
Hendricks Eliza R. (Mrs. Brown).
Henry, Lillian M., private nurse, Downingtown, Pa.
Hoge, Carrie M., private nurse, Washington, D. C.
Keemer, Jessie E. (Mrs. Robinson), Providence, R. I.
McEwen, Irene O. (Mrs. Green), Pensacola, Fla.
Rich, Anna, private nurse, Hartford, Conn.
Scott, Helen V. (Mrs. Cole), Swansboro, Ga.
Thompson, Isabella, private nurse, New Orleans, La.
Wilson, Emma C., private nurse, Montgomery, Ala.
Williams, Elmira E., deceased.

1900.

Clarke, Mary F., private nurse, Richmond, Va.
Hamilton, Priscilla, deceased.
Hawkins, Nannie E., private nurse, Charlotte, N. C.
Hunton, Mary A. (Mrs. Gordon), St. Louis, Mo.
Johnson, Hattie B. (Mrs. Cunningham), Owensboro, Ky.

1900—Continued.

Lewis, Eva P., private nurse, Manassas, Va.
Mickens, Marcella O., private nurse, Pittsburgh, Pa.
Middleton, Haga H., private nurse, Charleston, S. C.
Moody, Annie L., private nurse, Washington, D. C.
Smith, Cora V., private nurse, Camden, N. J.
Winfield, Laura, private nurse, Ware, Mass.

1901.

Allen, Margaret A., public-health nurse, Jacksonville, Fla.
Barks, Susan C., visiting nurse, Jacksonville, Fla.
Campbell, B. N., private nurse, Montgomery, Ala.
Dey, Mary L., private nurse, Philadelphia, Pa.
Hackley, Mamie E. (Mrs. Ash), Philadelphia, Pa.
Hanson, Carrie L., private nurse, Baltimore, Md.
Harrell, Catherine S. (Mrs. Butler), Texas.
Hunter, Bessie, private nurse, Washington, D. C.
Jackson, Eliza A., private nurse, Richmond, Va.
Jones, Mary J., private nurse, Washington, D. C.
Powell, Gussie D., private nurse, Richmond, Va.
Rhone, Charlotte S., private nurse, Newbern, N. C.
Robinson, Frances A., private nurse, Newbern, N. C.
Thomas, Bertha J., head nurse, Freedmen's Hospital, Washington, D. C.
Walcott, Louisa M., private nurse, Rockhill, S. C.
Whitley, Florence A., private nurse, Newbern, N. C.

1902.

Adams, Ella C., private nurse, Philadelphia, Pa.
Baker, Vera L., head nurse, State Hospital, Goldsboro, N. C.
Booth, Mary S., private nurse, Washington, D. C.
Delisse, Augusta V., private nurse, Brooklyn, N. Y.
Dias, Frances C., private nurse, Philadelphia, Pa.
Johnson, Gertrude B., private nurse, Niagara Falls, N. Y.

Occupations and residence of graduates—Continued.

1902—Continued.

Mason, Corinna (Mrs. Phillips), Springfield, Mass.
Nichols, Florence L. (Mrs. Avant), Charlotte, N. C.
Rogers, Amanda, private nurse, Indianapolis, Ind.
Roper, Maggie A., private nurse, Galveston, Tex.
Thompson, Rachel A. (Mrs. Thomas), deceased.

1903.

Balentine, J. L. (Mrs. Dial), Jacksonville, Fla.
Browne, E. M., head nurse, Douglass Hospital, Philadelphia, Pa.
Baltimore, Mary E., private nurse, Harrisburg, Pa.
Christie, Sarah E. (Mrs. Selah), Chester, Pa.
Coates, Maiella E., private nurse, Washington, D. C.
Hargrave, L. S., private nurse, Trenton, N. J.
Johnson, L. D., private nurse, Warrenton, N. C.
Johnson, Nellie V., private nurse, Abbeville, S. C.
Latney, Carrie L. (Mrs. Bowie), Washington, D. C.
Love, Ellen V., private nurse, Lumberton, N. C.
Purcell, E. J., private nurse, Brunswick, Ga.
Rollins, Clara A., private nurse, Washington, D. C.
Rutherford, Anna L., private nurse, Kingston, N. C.
Sharp, Carrie M. (Mrs. Morgan), Petersburg, Va.
Yarborough, S. V. S. (Mrs. Allen), Columbus, Ga.

1904.

Baker, Hattie E., private nurse, Darlington, S. C.
Blackwell, W. Lucille (Mrs. Morris), New York, N. Y.
Carter, Mary E., private nurse, Rippon, W. Va.
Carter, Elizabeth V., head nurse, Mercy Hospital, Philadelphia, Pa.
Grant, Anna E. (Mrs. Millen), Savannah, Ga.
Gilmore, Mary E., private nurse, Leavenworth, Kans.
James, Aleathia D. (Mrs. Franklin), Jacksonville, Fla.
Jeffries, Emma M., private nurse, Redbank, N. J.
Jones, Violet, private nurse, Hartford, Conn.

1904—Continued.

Lewis, Louzetta (Mrs. Mitchell), Montgomery, Ala.
Richardson, Effie V. (Mrs. McCoy), Washington, D. C.
Thomas, Marie E. (Mrs. Jones), Topeka, Kans.

1905.

Braxton, Margaret, private nurse, Hartford, Conn.
Brooks, Alpha E. (Mrs. Jones), Fairmont Heights, D. C.
Carter, Marion M., private nurse, Washington, D. C.
Henderson, Hattie E., private nurse, Cleveland, Ohio.
Holmes, Julia E., private nurse, Plainfield, N. J.
Jefferson, Roxanna M., private nurse, Bristol, Tenn.
Kidd, Bertha M. (Mrs. Harris), Washington, D. C.
Long, Ida E., private nurse, Newark, N. J.
Maston, Mary J., head nurse, Red Cross Sanitarium, Louisville, Ky.
Scott, Julia E., private nurse, New Haven, Conn.
Teabout, Stella, private nurse, Richfield Springs, N. Y.
Taliaferro, Olivia, private nurse, Anacostia, D. C.
Terry, Jessie C., private nurse, Los Angeles, Cal.
Williams, Daisy M. (Mrs. Moten), Sherman, Tex.
Williams, Mary T., private nurse, Ware Neck, Va.
Wilson, Annabel, private nurse, Baltimore, Md.

1906.

Barnes, Annie, private nurse, Baltimore, Md.
Bearce, Daisy M., private nurse, Rye, N. Y.
Burress, Mary E. (Mrs. Wormley), Ardwick, S. C.
Gordon, Mary B., private nurse, Washington, D. C.
Hall, Iona M., private nurse, Troy, Ohio.
Henderson, Sara O., private nurse, Newport, R. I.
Johnson, Harriett C., private nurse, Cleveland, Ohio.
Lewis, Willie A., private nurse, Atlanta, Ga.
Lucas, Marion V. (Mrs. Monroe), Washington, D. C.
McDougal, Colota M., district nurse, Indianapolis, Ind.

Occupations and residence of graduates—Continued.

1906—Continued.

McKnight, Viola, superintendent of nurses, Mercy Hospital, Philadelphia, Pa.
Marshall, Mary E., private nurse, Morristown, Tenn.
Merritt, Mary E., superintendent of nurses, Mitchell Hospital, Leavenworth, Kans.

1907.

Bullock, Blanche V., private nurse, Richmond, Va.
Childs, Helen D., private nurse, Philadelphia, Pa.
Escoffery, Lula M., private nurse, Atlantic City, N. J.
Harmon, Nannie M., private nurse, Tip Top, Va.
Porter, Susan H., dean woman's department, Tuskegee, Ala.
Payton, Lillian M., private nurse, Washington, D. C.
Peck, Alice M. (Mrs. Anderson), Boston, Mass.
Rose, Julia M. (private nurse, Lynchburg, Va.
Slocum, Mary E., private nurse, Providence, R. I.
Smith, Minnie M., private nurse, Amherst, Mass.
Taylor, Loretta P. (Mrs. Banks), Washington, D. C.
Wright, Nena J. (Mrs. Jackson), New York City.

1908.

Briggs, Cornelia K., private nurse, Troy, N. Y.
Denning, Clara S. (Mrs. Robinson), Baltimore, Md.
Douglas, Kate E. (Mrs. Barter), Newark, N. J.
Donaldson, Vesta I., private nurse, Ocean Grove, N. J.
Fray, Julia (Mrs. Clark), Chicago, Ill.
Henderson, Jamima S., private nurse, Spring Lake, N. J.
Jones, Bertie L., private nurse, Harrisburg, Pa.
Nicholas, Beatrice E., private nurse, Baltimore, Md.
Proctor, Eva M., private nurse, Newark, N. J.
Robinson, Alice E., private nurse, Hartsville, S. C.
Reynolds, Agnes, private nurse, Ironton, Ohio.

1909.

Allen, Irene P. (Mrs. Martin), deceased.
Burnett, Sarah L., private nurse, Washington, D. C.

1909—Continued.

Coates, Nana E., Battle Creek, Mich.
Curtis, Minnie M., private nurse, Marietta, Ohio.
Green, Lillian C. (Mrs. Davis), Washington, D. C.
Hall, Anita B., private nurse, Baltimore, Md.
Hankle, Areatha B. (Mrs. Bailey), St. Louis, Mo.
Johnson, Lillian A., private nurse, Poughkeepsie, N. Y.
Lewis, Charlotte M., private nurse, Atlanta, Ga.
Parker, Mary E., private nurse, Williamsport, Pa.
Sheppard, Emma D., private nurse, Meyersdale, Pa.
Smith, Annie M., private nurse, Jacksonville, Fla.
Spears, Lillian, private nurse, Providence, R. I.
Wainwright, Melinda E., Charles Town, W. Va.

1910.

Amby, Grace, married, Baltimore, Md.
Brown, Nellie V., private nurse, Meyersdale, Pa.
Howard, Mrs. Sankey B., Goldsboro, N.C.
Gates, Eugene J. P., private nurse, Washington, D. C.
Gilliam, Octavia T., private nurse, Hanover, Va.
Hutchinson, Mabel M., private nurse, Lockport, N. Y.
Jackson, Sara E., private nurse, Steelton, Pa.
Jordan, Maggie M., private nurse, Washington, D. C.
McClaine, Nettie L. (Mrs. George), Paducah, Ky.
Richardson, Lizzette S., private nurse, Washington, D. C.
Reid, Marion M., private nurse, Denver, Colo.

1911.

Blackburn, Clara E. (Mrs. Miller), Wheeling, W. Va.
Clay, Eva Virginia, Central State Hospital, Petersburg, Pa.
Coates, Edna May (Mrs. Gloster), Wheeling, W. Va.
Green, Emily Estella (Mrs. Allen), Washington, D. C.
Grisby, Sara Elizabeth, private nurse, Washington, D. C.
Harris, Florence M., private nurse, Brooklyn, N. Y.
Hopkins, Jennie C., private nurse, New York City.

Occupations and residence of graduates—Continued.

1911—Continued.

Patton, Jesse Boyd, superintendent of nurses, Mercy Hospital, Nashville, Tenn.
Piper, Ida J. (Mrs. Robinson), Boston, Mass.
Price, Mae Irene, private nurse, Baltimore, Md.
Stevens, Nettie Bentley, private nurse, Atlanta, Ga.
Thompson, Lulu E., private nurse, Washington, D. C.
York, Martella M., head nurse, Freedmen's Hospital, Washington, D. C.

1912.

Abner, Carrie (Mrs. Bumbry), Chicago, Ill.
Butler, Marguerite C., private nurse, Boston, Mass.
Carter, Elizabeth F. A., private nurse, Washington, D. C.
Christian, Estelle A., private nurse, Richmond, Va.
Eaton, Sadie E., private nurse, Raleigh, N. C.
Simmons, Mary A. (Mrs. Moore), Magnolia, N. J.

1913.

Anderson, Maude H. private nurse, Philadelphia, Pa.
Barnes, Mayme, Central State Hospital, Petersburg, Va.
Berkley, Pearl B., private nurse, Washington, D. C.
Davis, Alice E., private nurse, Frederick, Md.
Elliott, Frances R., private nurse, Washington, D. C.
Garrott, Roberta Lee, private nurse, Washington, D. C.
Green, Cecilia M., head nurse, Freedmen's Hospital, Washington, D. C.
Henry, Eva G., private nurse, Washington, D. C.
Howland, Elizabeth B., private nurse, Brooklyn, N. Y.
Jackson, Edna V. (Mrs. Brooke), Kansas City, Mo.
Jordan, Emily M., private nurse, Washington, D. C.
Kemper, Etta C., Barnett Hospital, Huntington, W. Va.
Lawson, Bessie M., private nurse, Pittsburgh, Pa.
Meredith, Angie E. (deceased).
Ockrey, Minnie, Edward's Hospital, Bluefields, W. Va.
Russell, Josephine M., private nurse, Washington, D. C.
Wingate, Elizabeth E., private nurse, Charleston, S. C.

1914.

Byrd, Carrie Lena, private nurse, Wilmington, Del.
Cargyle, Laura Aurelia, private nurse, Atlanta, Ga.
Clark, Ophelia Elizabeth, private nurse, Indianapolis, Ind.
Jackson, Alice Veronica, private nurse, Washington, D. C.
Jordan, Blanche Lillian, private nurse, Washington, D. C.
Minor, Ethel Mae, private nurse, Blue Plains, D. C.
Mundin, Maude E., private nurse, Richmond, Va.
Robinson, Adaline, private nurse, Kansas City, Mo.
Shelton, Willie Belle, private nurse, Buffalo, N. Y.
Smith, Lena Mae, private nurse, Washington, D. C.
Thompson, Edna Sylvia, private nurse, New York City.
Varner, Amanda Evalina, private nurse, Atlanta, Ga.
Walker, Olive Glennie, public health service, Cleveland, Ohio.
Williamson, Lulu Howard (Mrs. Kingslow), Bluefield, W. Va.

1915.

Benson, Katherine Zada, private nurse, Washington, D. C.
Brown, Marion Hilda, private nurse, Bluefield, W. W. Va.
Johnson, Helen Clotilda, private nurse, Wilkes-Barre, Pa.
Lovett, Caroline Beatrice (Mrs. Terry), Williamsport, Pa.
Martin, Alice Ellen, private nurse, Birmingham, Ala.
Owen, Christie Elaine, head nurse, Freedmen's Hospital, Washington, D. C.
Sheppherd, Mary J., private nurse, Meyersdale, Pa.
Spurlock, Pearl Mabel, private nurse, Pittsburgh, Pa.

1916.

Clifford, Helen Healy, private nurse, Martinsburgh, W. Va.
Gill, Edith Berncenia, private nurse, Pittston, Pa.
Graham, Carrie Francis, private nurse, Boston, Mass.
Hammie, Lola Montice, private nurse, Washington, D. C.
Holmes, Cora Lee, private nurse, Norfolk, Va.
Lightfoot, Josephine, Julia, private nurse, Berryville, Va.
May, Charlotte King, private nurse, Holton, Kans.

Occupation and residence graduates—Continued.

1916—Continued.

Marsh, Louise Veronica, private nurse, Norfolk, Va.
Minnis, Nancy Jeanette, private nurse, Norfolk, Va.
Scott, Irene Rhodelia, private nurse, Atlanta, Ga.
Smith, Georgia Penn (Mrs. Reed), Washington, D. C.
Walker, Fannie Geneva, private nurse, Lockland, Ohio.
Weeks, Mary Viola, private nurse, Norfolk, Va.
Yeatman, Lucille Bernice, private nurse, Philadelphia, Pa.

1917.

Boulding, Susie M., private nurse, Washington, D. C.
Butler, Josephine M., private nurse, Hutchinson, Kans.
Brown, Irene, private nurse, Washington, D. C.
Chambers, Alice, private nurse, Baltimore, Md.
Cole, Aileen, private nurse, Washington, D. C.
Doyle, Mabel, (Mrs. Keating), New York.

1917—Continued.

Edwards, Esther, private nurse, Washington, D. C.
Gillard, Lenore (Mrs. Kizer), Washington, D. C.
Harris, Sarah E., private nurse, Galveston, Tex.
James, Pauline, at home, Washington, D. C.
Jones, Harriet W., private nurse, New York.
Lacount, Gertrude, private nurse, Washington, D. C.
Moses, Florence, private nurse, Washington, D. C.
Porter, Beatrice, private nurse, Chicago, Ill.
Smith, Inez, private nurse, Washington, D. C.
Walker, Louise, private nurse, Galveston, Tex.
West, Jeanette, private nurse, Washington, D. C.
White, Arline, private nurse, Fayetteville, N. C.
Hill, Sophia, private nurse, Washington, D. C.
Yancy, Edith, private nurse, Washington, D. C.

Very respectfully,

W. A. Warfield,
Surgeon in Chief.

The Secretary of the Interior.

REPORT OF THE PRESIDENT OF HOWARD UNIVERSITY

ROSTER OF OFFICERS.

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Term Expires 1919.

Justice JOB BARNARD, LL. D., Washington, D. C.
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Term Expires 1920.

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MARCUS FITZHERBERT WHEATLAND, M. D., Newport, R. I.
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PATRON EX OFFICIO.

Hon. FRANKLIN KNIGHT LANE, Secretary of the Interior.

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* Succeeded, July 1, 1918, by J. Stanley Durkee, D. D., Ph. D.

REPORT OF THE PRESIDENT OF HOWARD UNIVERSITY.

HOWARD UNIVERSITY,
Washington, D. C., July 1, 1918.

SIR: I have the honor to submit for Howard University the following report, showing the condition of the institution on the 1st day of July, 1918, "embracing therein the number of pupils received and discharged or leaving the same for any cause during the year and the number remaining; also the branches of knowledge and industry taught and the progress made therein, together with a statement showing the receipts of the institution, and from what sources, and its disbursements and for what objects."

REGISTRATION.

The effect of the war was seen very clearly at the opening of the fall semester in a decreased enrollment. The number registering fell nearly 200 below that of the corresponding weeks of the last previous year. This affected all departments in the final totals for the year, except in the case of the school of manual arts and applied sciences, which conducted war classes in the teaching of radio work to a large number of enlisted men. This brought the number in this department up to 257, against 40 the preceding session. The total for the year has been 1,493, not including 90 who took by correspondence in the school of theology. The final total is 1,583, an increase of 18 over the year 1916–17. The students came from 38 different States and 13 foreign countries.

Students during year ended June 30, 1918.

College of arts and sciences	335
Teachers' college	114
School of manual arts and applied sciences	257
Conservatory of music	113
School of theology	51
School of medicine	302
School of law	72
Academy	279
Commercial college	134
Total	1, 657
Names duplicated because of students taking special courses in different departments	164
Net total	1, 493
Correspondence students not counted above	90
Final total	1, 583

The total number graduated was 227, distributed as follows:

Graduates in 1918.

College of arts and sciences	49
Teachers' college	21
Normal course	1
Kindergarten	3
School of theology	12
Medical college	24
Dental college	52
Pharmaceutic college	8
School of law	19
School of manual arts and applied sciences	2
Academy	30
Commercial college	6
Total	227

COURSES IN AGRICULTURE.

The trustees at their midwinter meeting voted to inaugurate college courses in agriculture and a four years' plan of study was adopted leading to the degree of bachelor of science in agriculture.

THE SCHOOL OF THEOLOGY.

A constant effort is made to make the teaching of the Bible more thorough and adequate for all the demands made upon the modern minister. Students are encouraged to get a full general training in college before entering upon professional study. Observation among our graduates shows that those who have done this are much more successful in doing their work. The school is not under the control of any society or denomination and students from all denominations attend it. The extension work by correspondence is very useful. No part of the congressional appropriation goes to the support of this department.

The roll of students for the year was as follows:

Students in the school of theology.

Seniors	9
Middlers	8
Juniors	11
Unclassified	6
	34
Correspondence students matriculated as university students	17
Total	51
Correspondence students not matriculated as university students	90
	141

Of these, six received degrees and six received diplomas.

THE SCHOOL OF MEDICINE.

By the plan of exemption established by the United States Government, the school of medicine has been affected very little in numbers. An unusually fine set of students has been in attendance for the year. The school ranks in class A of the American Medical Association and its graduates are known everywhere for their skill and success. The three colleges in this school—viz, medicine, dentistry, and pharmacy—are constantly improving their equipment in order to keep abreast of the very latest achievements of science. The privileges enjoyed by our students for the observation of diseases of all kinds in the Freedmen's Hospital are unexcelled in any school of the country.

The roll of students for the year was as follows:

Students in medical school.

Seniors	31
Juniors	27
Sophomores	34
Freshmen	22
Senior dental	57
Second year dental	40
First year dental	55
Senior pharmaceutic	15
Second year pharmaceutic	9
First year pharmaceutic	12
Total	302

Of these, 84 received degrees—24 in medicine, 32 in dentistry, and 8 in pharmacy.

THE SCHOOL OF LAW.

One of the teachers of this school became an officer in the Army and a readjustment of work had to be made with an addition to the teaching force. The year passed very successfully. More and more students in law, as is the case with students in the other professional departments, are taking advantage of the combination courses with the college of arts and sciences. This plan prevails in the best institutions of the country.

The roll of students for the year was as follows:

Students in law school.

Seniors	22
Middlers	19
Juniors	31
Total	72

Of these, 19 received degrees.

THE COLLEGE OF ARTS AND SCIENCES.

A large number of students in this department became members of the Officers' Training Camp at Fort Des Moines in the summer and fall of 1917 and received commissions. In spite of this the numbers of the two upper classes were kept above those of the preceding year. In the two lower classes a large decrease is evident. The work was seriously affected by the entrance of teachers into the Army from time to time, but provision was made for all necessities.

The roll of students was as follows:

Students in college of arts and sciences.

Seniors	48
Juniors	56
Sophomores	77
Freshmen	134
Specials	20
Total	835

Of these, 49 received degrees.

THE TEACHERS' COLLEGE.

In accordance with the best practice in the work of training teachers everywhere, the effort of the year has been to bring the class work nearer to the ideal of professional training. We have a strong and united faculty which gives careful attention to the needs of the great number of secondary and rural schools which ought to become brighter and brighter lights in the communities in which they are located. Our teachers recognize the need that each rural school should be a community center of helpful service.

The roll of students was as follows:

Students in teachers' college.

Seniors	13
Juniors	28
Sophomores	27
Freshmen	29
Part course	17
Total	114

Of these, 25 received degrees and diplomas.

THE SCHOOL OF MANUAL ARTS AND APPLIED SCIENCES.

The courses of this department have been better and better consolidated the past year. It is the first department to enter into distinctive war work as is shown by its list of students. The teaching of radio work was commended very highly by the officers of the United States Army who examined the school.

The roll of students for the year was as follows:

Students in the school of manual arts and applied sciences.

Sophomores	15
Freshmen	18
Industrial	6
Special	3
Part course	3
Academy	61
Commercial college	9
Radio school	142
Total	257

THE CONSERVATORY OF MUSIC.

The influence of the conservatory is increasing every year and the past year has been no exception. The entrance of male students into the Army depleted the skilled choir maintained by the department. No graduates were had this year because of insistence upon the very highest standards.

The roll of students for the year was as follows:

Students in the conservatory of music.

Vocal	28
Piano	88
Violin	11
Organ	7
Harmony	16
History	3
	153
Names duplicated	40
Total	113

THE LIBRARY SCHOOL.

A library training class has been maintained the past year, but the operation of a full library course of study must be deferred until a larger staff can be employed so as to permit the teaching of all required studies. Such work is greatly needed.

THE ACADEMY.

The academy suffered during the year more than any other department by the leaving of students to enter some branch of the Army, but the work was carried on unceasingly with the very best results. Very high standards are maintained, and our diploma is recognized by the best institutions of the country.

The roll of students for the year was as follows:

Students in the academy.

Seniors	53
Middlers	62
Submiddlers	68
Juniors	61
Unclassified	35
Total	279

THE COMMERCIAL COLLEGE.

The numbers of this department increased very largely for the year owing to the demand for specially trained typewriters and stenographers. Two of the efficient teachers in this department received commissions in the Army, and, as in all other cases, they were given leave of absence for the war and substitutes employed.

The roll of students for the year was as follows:

Students of the commercial college.

Fourth year	9
Third year	17
Second year	11
First year	12
Special	84
Total	133

WAR WORK.

The experience of the year showed that the university was ready to take a large part in the support of the United States in the war.

Teachers of all departments have become officers, and some of them are across the water. The same thing is true of many students. The teaching of radio work continued from November, 1917, to the end of the session.

It became evident in April, 1918, that the War Department needed the university for the training of drafted men. The trustees voted at once to close the session a month ahead of time, and commencement was held upon May 8. On May 16, 300 drafted men were placed in our dormitories by the War Department to be taught radio work, bench woodwork, and electrical repair work. Much of their time is occupied with military drill and physical exercises. The university is for the summer a military post, and the success of the work is exceptionally fine.

The university rejoices in the spirit of patriotism which pervades it and in the very important contributions it is making to the welfare of the Nation.

It is my duty to report that by resignation my term of office as president expired June 30, 1918, in order that I might enter upon other duties. The trustees at their annual meeting June 4, 1918, elected Rev. J. Stanley Durkee, A. M., Ph. D., to succeed me, and upon July 1, 1918, he assumed the duties of the office.

REPORT OF THE TREASURER.

The financial statement for the year 1917–18 is appended. We have retained during the year the same helpers in our accounting room, and the auditing of all our accounts has been done by chartered accountants. The expenditure of all money appropriated for our use by Congress takes place under the rigid supervision of the Department of the Interior.

STEPHEN M. NEWMAN, *President.*

The SECRETARY OF THE INTERIOR.

FINANCIAL REPORT.

Expenditure of appropriation for maintenance, fiscal year ended June 30, 1918.

Administration:		
President, in part	$3,600.00	
Secretary, dean of commercial college, and professor, in part	2,025.00	
Treasurer, registrar, and professor of economics and political science, in part	2,025.00	
		$7,650.00
College of arts and sciences:		
Dean and professor of mathematics, in part	1,584.00	
One professor of biology, in part	1,485.00	
One professor of history, in part	1,485.00	
One professor of English, in part	1,485.00	
One professor of Latin, in part	1,485.00	
One professor of chemistry, in part	1,035.00	
One professor of physics, in part	1,485.00	
One professor of Greek, in part	450.00	
One instructor in French, in part	1,237.50	
One associate professor of mathematics, in part	1,200.00	

College of arts and sciences—Continued.		
One instructor in English, in part	$560.00	
One associate professor of chemistry, in part	945.00	
One instructor in botany, in part	630.00	
One assistant professor in German, in part	787.50	
One instructor in chemistry, in part	1,012.50	
One instructor in English, in part	720.00	
One instructor in physics, in part	490.00	
		$18,136.50
Teachers' college:		
Dean and professor of pedagogy, in part	1,584.00	
One associate professor of mathematics, in part	1,440.00	
One professor of psychology, in part	1,305.00	
One associate professor of practice teaching, in part	1,260.00	
One professor of nature study, in part	675.00	
One instructor in teaching history, in part	787.50	
One instructor in French, in part	320.00	
		7,371.50
Academy:		
One dean and associate professor of mathematics, in part	1,584.00	
One professor of ancient languages, in part	1,439.98	
One instructor in English, in part	990.00	
One instructor in French and Spanish, in part	65.00	
One instructor in English, in part	675.00	
One associate professor of ancient languages, in part	990.00	
One instructor in Latin and French, in part	630.00	
One acting instructor in mathematics, in part	480.00	
One acting instructor in French, history, and biology, in part	420.00	
		7,273.98
Commercial college:		
One instructor in bookkeeping, in part	900.00	
One instructor in finance and typewriting, in part	1,051.94	
One instructor in shorthand, in part	765.00	
One acting instructor in English, in part	480.00	
One instructor in bookkeeping, in part	666.00	
One associate professor of history, in part	967.50	
		4,830.44
Conservatory of music:		
One director and professor of singing, in part	1,305.00	
One professor of pianoforte and organ, in part	1,170.00	
One instructor in piano, in part	765.00	
One instructor in violin, piano, and harmony, in part	630.00	
		3,870.00
Library:		
One librarian, in part	1,584.00	
One assistant librarian, in part	675.00	
One cataloguer, in part	300.00	
One assistant librarian, in part	450.00	
One cataloguer, in part	65.00	
		3,074.00
Bookkeeper, in part	1,000.00	
One clerk, in part	670.00	
One clerk, in part	90.00	
One telephone operator, in part	600.00	
One assistant to the secretary, in part	792.10	
One preceptress, in part	630.00	
One secretary to the president, in part	375.00	
One cashier, in part	650.00	
One assistant preceptress, in part	180.00	
One stenographer, in part	350.00	
		5,337.10
School of law:		
Dean and lecturer on constitutional law, in part	1,300.12	
One lecturer on pleading and practice, in part	750.00	
One lecturer on torts, crimes, etc., in part	1,500.00	

School of law—Continued.		
One lecturer on evidence, etc., in part	$1,500.00	
One lecturer on real property, etc., in part	900.00	
One lecturer on partnership, etc., in part	900.00	
One instructor in contracts, "case system," in part	300.00	
One lecturer on negotiable instruments, in part	250.00	
		$7,400.12
Total salaries		64,943.64
Stationery		56.36
Total		65 000.00

Expenditure of appropriation for manual arts and applied sciences.

One director and instructor in civil engineering	$1,760.00	
One instructor in mechanics and surveying	200.00	
One instructor in electrical engineering	770.00	
One instructor in printing	800.00	
One instructor in domestic science	1,100.00	
One instructor in domestic arts	900.00	
One professor of the biological sciences, in part	850.00	
One instructor in woodworking and drawing	600.00	
One instructor in radio and buzzer operator	100.00	
One assistant instructor in vocational training	225.00	
One clerk	450.00	
Janitors and laborer	390.00	
		$8,145.00
Equipment		2,047.56
Supplies, etc		1,807.44
Total		12,000.00

Expenditure of appropriation for natural-history studies and laboratories.

Chemical laboratory	$550.00
Biological laboratory	275.26
Physics laboratory	550.27
Nature-study laboratory	201.15
Academy physics and chemistry supplies	130.03
Zoology supplies	293.29
Total	2,000.00

Expenditure of appropriation for repairs of buildings and improvement of grounds.

Repairs to buildings	$8,733.30
Improvement of grounds	1,266.70
Total	10,000.00

Expenditure of appropriation for libraries.

Academy library books, etc	$1,267.03
Law-library books, etc	232.65
Total	1,499.68

Expenditure of appropriation for fuel and light.

Fuel and labor, central heating plant	$3,200.00
Other fuel	300.00
Total	3,500.00

Expenditure of appropriation for school of medicine.

Equipment and apparatus	$2,501.00
Laboratory supplies	1,931.65
Repairs to laboratories and buildings	2,567.35
Total	7,000.00

Distribution of expenditures from Government appropriations.

Appropriations.	Amount.	Expenditures.	
		Current fund.	Permanent-plant fund.
Disbursed through chief disbursing clerk of interior department:			
Maintenance, salaries, etc.	$65,000.00		
Salaries		$64,943.64	
Stationery		56.36	
Department of manual arts, apparatus and material	12,000.00	9,952.44	$2,047.56
Libraries, equipment, books, etc.	1,499.68		
Law		179.15	53.50
Academic		190.00	1,077.03
Improvement of grounds and repairs of buildings	10,000.00	10,000.00	
School of medicine, repairs to laboratories, laboratory supplies and equipment	7,000.00	4,499.00	2,501.00
Laboratories, material and apparatus	2,000.00	943.21	1,056.79
Fuel and light	3,500.00	3,500.00	
Total credit permanent fund account			6,735.88
Total credit current fund		94,263.80	94,263.80
Total appropriations	100,999.68		100,999.68

Balance sheet as at June 30, 1918.

ASSETS.

Current assets:		
Cash in bank and on hand	$4,365.20	
Students' debit balances, less reserve	8,131.06	
Accounts receivable	1,080.67	
Note receivable	400.00	
Stock of supplies on hand	3,341.59	
Unexpired insurance	62.45	
Sundry investments	6,082.75	
Total current assets		$23,463.72
Educational plant:		
Land	616,057.47	
Buildings	619,857.52	
Equipment	164,251.79	
Total education plant		1,400,166.78
Investment of trust funds:		
Productive real estate, mortgages, and other securities	310,395.10	
Unproductive land	96,779.90	
Total investments		407,175.00
Special war training:		
Expended May 15 to June 30, 1918	9,013.31	
Received on account to June 30, 1918	7,780.67	
Balance carried as deferred asset		1,232.64
Total assets		1,832,038.14

LIABILITIES AND FUNDS.

Current liabilities:			
Notes payable		$500.00	
Accounts payable		4,435.69	
Note receivable discounted		400.00	
Students' credit balances		1,586.14	
Total current liabilities			$6,921.83
General capital funds:			
Unexpended balances of special funds		2,840.70	
General surplus	$4,918.66		
Medical surplus	10,015.17		
		14,933.83	
Plant capital		1,400,166.78	
Total general capital funds			1,417,941.31
Trust funds:			
Permanent endowment funds		310,395.10	
Land fund (unrestricted)		96,779.90	
Total trust funds			407,175.00
Total liabilities and funds			1,832,038.14

General summary of income and expenditure for the year ended June 30, 1918.

EXPENDITURE.

Instruction:		
College of arts and sciences, teachers' college, commercial college, and academy	$57,319.53	
Academic laboratories	2,856.19	
School of theology	7,937.96	
School of law	9,424.61	
School of medicine	38,396.01	
Conservatory of music	5,361.30	
School of manual arts and applied sciences	10,950.72	
Library	6,051.55	
Gymnasium	1,509.45	
Y. M. C. A.	1,200.00	
		$141,007.32
Dormitories and dining room:		
Dormitories, net surplus	665.29	
Dining room, net cost	1,074.76	
Net cost		409.47
Maintenance		13,027.77
Administration		16,993.54
Students' aid		1,889.89
Miscellaneous		211.79
Total current expenditure		173,539.78
Improvements and additions to plant		9,126.70
Total expenditure		182,666.48
Surplus of income for the year:		
The general fund, surplus	1,072.16	
The medical school, surplus	1,973.55	
	3,045.71	
Special funds, unexpended balance	134.00	
		3,179.71
		185,846.19

INCOME.

From students—fees	$63, 374. 60
From endowment—rents and interest	13, 714. 07
From public funds—Federal Government appropriation	100, 999. 68
From donations—various donors	3, 115. 49
From other sources	4, 642. 35
Total income	185, 846. 19

SUMMARY OF ALL INCOME AND EXPENDITURE.

Expenditure as above		$182, 666. 48
Additional expenditure:		
Boarding hall	$21, 694. 74	
Dormitories	9, 820. 38	
Athletic	4, 476. 44	
		35, 991. 56
Total expenditures for all purposes		218, 658. 04
Income as above		185, 846. 19
Additional income:		
Boarding hall	21, 694. 74	
Dormitories	9, 820. 38	
Athletic	5, 209. 86	
		36, 724. 98
Total income for all purposes		222, 571. 17

Income and expenditure for year ended June 30, 1918.

INCOME.

Tuition and other fees:		
Academic departments	$18, 508. 57	
Academic laboratories	2, 140. 28	
School of theology	142. 00	
School of law	3, 259. 00	
School of medicine	31, 703. 00	
Conservatory of music	3, 955. 18	
School of manual arts and sciences	35. 00	
School of manual arts and sciences, summer school	330. 00	
Library	1, 904, 72	
Gymnasium	1, 396. 85	
		$63, 374. 60
Income from endowment:		
For academic departments	278. 11	
School of theology	3, 249. 28	
School of medicine	860. 00	
Library	21. 25	
Students' aid	3, 359. 14	
Special purposes	167. 03	
General purposes	5, 779. 26	
		13, 714. 07
Federal Government appropriation:		
For laboratories	2, 000. 00	
School of law	7, 572. 88	
School of medicine	7, 000. 00	
School of manual arts and applied sciences	12, 000. 00	
Library	1, 499. 68	
General purposes	70, 927. 12	
		100, 999. 68
Donations:		
For school of theology	2, 810. 49	
Students' aid	126. 00	
Special purposes	2. 00	
General purposes	177. 00	
		3, 115. 49

From other sources:		
Interest and rent	$961.02	
Miscellaneous receipts	3,681.33	
		$4,642.35
Total income		185,846.19

Expenditures for current purposes.

Academic departments:		
Salaries of instructors	$54,106.04	
Janitors' wages	1,489.51	
Commencement expense	579.50	
Chapel expenses (net)	582.01	
Other expenses	562.47	
		$57,319.53
Academic laboratories. supplies:		
Chemistry	1,762.10	
Physics	177.79	
Biology	162.75	
Chemistry and physics (academy)	138.24	
Nature study	145.73	
Zoology	457.57	
Biology (academy)	12.01	
		2,856.19
School of theology:		
Salaries of instructors	7,734.73	
Traveling and other expenses	203.23	
		7,937.96
School of law:		
Salaries of instructors, librarian, and clerk	9,020.10	
Repairs	95.58	
Heat, light, cleaning, and other expenses	808.93	
	9,924.61	
Deduct—rent of offices	500.00	
		9,424.61
School of medicine:		
Salaries of officers and instructors	28,770.00	
Laboratory supplies	4,130.34	
Repairs and renewals	3,138.49	
Other expenses	2,357.18	
		38,396.01
Conservatory of music.		
Salaries of instructors	3,971.00	
Heat, light, cleaning, and other expenses	1,235.80	
Repairs	154.50	
		5,361.30
School of manual arts and applied sciences:		
Salaries of instructors and laborers	8,442.90	
Supplies in divisions	2,936.67	
Heat, light, cleaning, and other expenses	910.88	
Summer school	290.00	
	12,580.45	
Deduct—printing-office sales	1,629.73	
		10,950.72
Library:		
Salaries of librarians	3,922.83	
Heat, light, and cleaning	762.00	
Repairs	71.50	
Periodicals	906.08	
Other expenses	389.14	
		6,051.55

Gymnasium:		
Salaries	$1,352.00	
Other expenses	157.45	
		$1,509.45
Y. M. C. A.:		
Salary and expenses (net)	1,333.00	
Deduct—donations received	133.00	
		1,200.00
Dormitories:		
Salaries and wages	3,500.01	
Heat and light	860.09	
Repairs and renewals	4,081.54	
Other expenses	1,378.74	
	9,820.38	
Deduct—faculty and student rents	10,485.67	
Net surplus	665.29	
Dining hall:		
Salaries and wages	5,074.54	
Supplies	16,537.85	
Heat and light	326.42	
Repairs and renewals	556.45	
Other expenses	274.24	
	22,769.50	
Deduct—charge to students	21,694.74	
Net cost	1,074.76	
Net cost on dormitories and dining hall		409.47
Maintenance:		
Salaries and wages	1,828.00	
Heat, light and power	1,966.20	
Repairs to buildings	6,044.45	
Care and improvement of grounds	2,641.06	
Insurance	315.38	
Miscellaneous	232.68	
		13,027.77
Administration:		
Salaries and wages	13,069.53	
Printing and stationery	521.79	
Postage	247.37	
Publications	1,276.51	
Advertising	415.61	
Telephone and telegrams	779.50	
Traveling expenses	71.55	
Miscellaneous	611.68	
		16,993.54
Students' aid:		
Scholarships and gratuities (net)		1,889.89
Miscellaneous:		
Sundries	105.36	
Debating current expenses	106.43	
		211.79
Total		173,539.78

(*b*) *Expenditure for improvements.*

Equipment:		
Laboratories	$983.07	
School of law	112.97	
School of medicine	2,794.00	
Department of music	1,383.51	
Department of manual arts and applied sciences	2,047.56	
Library books and equipment	1,805.59	
		$9,126.70
Total expenditure		182,666.48

REPORT OF THE SUPERINTENDENT UNITED STATES CAPITOL BUILDING AND GROUNDS.

Office of the Superintendent,
United States Capitol Building and Grounds,
September 23, 1918.

Sir: I beg to submit herewith a report of the work carried out under this office for the fiscal year 1918.

SENATE WING OF THE CAPITOL.

Repairs in the Senate wing of the Capitol include the cutting and equipment of a doorway connecting the rooms of the Senate Committee on Naval Affairs, the removal of the 10-inch steam pipe in the heating plant of the Senate wing and the installation of 50 feet of 6-inch pipe in its place, repairs and renewals of the portions of the refrigerating plant of the Senate kitchen, the paving of the floors of the Senate terraces with cement, laying cement floors in room No. 11 of the Senate terrace and in rooms of the west and north terrace to be used as storage rooms and painting and touching up as needed the following rooms: Senate Committee on Appropriations, Senate Committee on Banking and Currency, Senate Committee on Coinage, Weights, and Measures, Senate Committee on Military Affairs, Senate Committee on Expenditures State Department, Senate Committee on Expenditures Treasury Department, Senate Committee on Foreign Relations, Senate Committee on Commerce, Senate Committee on Post Offices and Post Roads, Senate Committee on Rules, Senate Committee on Finance, Senate Committee on Manufactures, the rooms of the President and the Vice President, office of the Sergeant at Arms of the Senate, walls of the Senate Chamber, Senate cloakroom, Senate lobby, Senate reception room, the marble room, Senate disbursing office, office of the Secretary of the Senate, Senate stationery room, Senate library, private dining room of the Senate, pages' room, Senate kitchen, public and private toilets of the Senate and all elevator shafts.

HOUSE WING OF THE CAPITOL.

In this section of the Capitol Building a new marble mantle has been installed in the committee room of Foreign Affairs and the room painted. In the main corridor of the subbasement of the House wing 1,500 feet of cement floors have been laid, the walls of the corridors of the House terrace and the terrace office occupied as an office have been painted and general painting and touching up attended to in the following rooms: Ways and Means, Invalid Pensions, disbursing office, Expenditures in Treasury Department, Coinage, Weights, and Measures, Naval Affairs, Banking and Currency, Expenditures in the State Department, Railways and Canals, Clerk of the House, Sergeant at Arms, House restaurant, House folding room, employees' barber shop, pages' room, janitor's room, doors in House gallery refinished, walls of House Chamber touched up, doors of House restaurant refinished, all public and private toilets painted as well as walls and ceilings of all corridors and elevator shafts, detention room and corridors of the House terrace.

MISCELLANEOUS REPAIRS.

In addition to the work previously mentioned, there has been a general repair and painting of all doors and windows of the entire Capitol Building, all elevators, lifts, and dumb waiters have been overhauled and new equipment supplied as necessary, the roofs of the building have been thoroughly repaired, skylights made water-tight, the plumbing of the entire building kept in good condition, modernized in many instances, and two new toilets installed for the use of the Senate library and Supreme Court; painting attended to in the Supreme Court room, the law library, marshal's office, and Court reference room. The minor repairs not before referred to number during the year 890.

PAINTING THE DOME.

Owing to the construction of the dome, it has been necessary to paint it about once in four years and upon such occasions it has been customary to extend the painting operations to a general repair of the painted work in various portions of the Capitol Building including the painting of the entire exterior of the central portion of the Capitol Building in order to preserve the sandstone of which the central portion is constructed. At such times, all of the window frames and sash of the entire Capitol Building are painted. In addition to the exterior painting referred to, the statue of Freedom is then cleaned and the platinum insulating tips in the headdress of the statue repointed or repaired. During the fiscal year ended June 30, 1918, all of the foregoing work referred to has been done and in addition thereto, extensive painting of rooms and corridors in the entire Capitol has been included in the painting operations. Forty-three thousand five hundred and thirty-six pounds of paint have been required to cover the 130,488 yards of surface comprised in this work. Additional particulars concerning work done in various portions of the Capitol Building will be found in other sections of this report.

UNITED STATES CAPITOL GROUNDS.

By reason of the settlement of the railroad tunnel in First Street, it has been necessary in order to repair the damage done thereby to rebuild 1,530 lineal feet of granite wall, reset 1,530 feet of granite curb, lay 3,450 square yards of cement sidewalk and 1,400 feet of asphalt pavement. In connection with this work, the concrete tunnels for the heating pipes and the electric wiring from the Capitol power plant have been reconstructed or repaired as required.

Other work upon the Capitol Grounds may be summarized as follows:

On the lawns west of First Street between B Street NE. and B Street SE., 30 cubic yards of soil have been used to fill the depressions in this area and 30 shrubs and plants lifted to grade and the soil seeded. This operation included 1½ acres in area.

Six large trees have been removed on account of age and other causes resulting in their loss and several pecan and other native trees planted; 32 young hemlock trees have been used in replacing poorer specimens about the subway vents near the House and Senate wings of the United States Capitol; all of the trees in the southwest section of the grounds and 30 trees in the northwest section have been pruned of dead wood. Some of these trees have been surgically treated and cavities properly filled. All oak trees throughout the grounds have been sprayed for scale and the elm trees sprayed for the elm-leaf beetle. All shrubs in the grounds have been pruned of the dead wood resulting from winter killing. Two granite columns have been renewed at the drinking fountain on the west side of the grounds, the brick base of the grotto fountain reset and the entire brickwork of the grotto reset or pointed as necessary. Granite bases of the two fountains near the east plaza have been reset and pointed as required, the six granite electric lamp pedestals in the same section pointed up. Two thousand seven hundred lineal feet of coping have been reset and pointed and all necessary repairs to driveways and walks have been made.

CAPITOL POWER PLANT.

The Capitol power plant was operated during the past fiscal year with continued success. With the concurrence of the House Office Building Commission, the new Interior Department Building has been lately supplied with current from this plant pending the construction of a central heating, lighting, and power plant by the Treasury Department. The commission has also given its approval to a breakdown service to be installed between the navy yard and this plant. This service will be of such character as to be mutually serviceable to the navy-yard plant and the Capitol power plant.

ENGINE HOUSE, SENATE AND HOUSE STABLES.

Necessary repairs of the roofs of the Senate stables and the cottage have been made and the roofs painted; the wagon shed at the House stables reconstructed and converted to a garage for the use of the trucks of the House post office and folding rooms; new cement floors put down, a new toilet installed, the garage painted, all needed repairs to doors and windows attended to and the heating system of the United States Botanic Garden extended to the garage.

COURT OF CLAIMS BUILDING.

Repairs at the Court of Claims Building have been continued during the past year. This work has also included painting and ordinary repair work to supplement and complete the more extensive repairs of the preceding fiscal year; new furniture has been installed and much needed equipment in the way of rugs, window shades and electric lighting apparatus supplied.

RECONSTRUCTION OF COURTHOUSE, WASHINGTON, D. C.

The work of reconstruction of the courthouse is proceeding at present with satisfactory results. At the date of this report the exterior stonework in the building has reached the third-floor levels on the north, east, and west sides of the building, the front being somewhat delayed due to the more complicated nature of the work, such as the stonework in the central and east and west porticos. The ground work of the heating and ventilating system has been practically all installed, leaving the placing of fixtures and apparatus to a later date after the building has been plastered. The early construction of the concrete roofing and its covering has enabled us to proceed on the interior, and as a whole the work may be said to be about 60 per cent completed. About 30 per cent of the plaster work has already been done. A final report on the reconstruction of this building will give more in detail the character of the work and the difficulties encountered. Congress has been generous in its appropriations for the building, increasing the amount of the original estimate due to changed conditions in the labor and material markets. A financial statement of costs to date will be found in the appendix.

NEW WOMEN'S DORMITORY, COLUMBIA INSTITUTION FOR THE DEAF.

The completion of the above building just prior to the date of this report affords a much needed addition to the functions and accommodations of the Columbia Institution for the Deaf.

The total cost of the structure was $182,500.

A financial statement will be found in the appendix. The items set forth therein show costs of various portions of the construction as well as the several appropriations made therefor.

The building, the exterior of which is of red tapestry brick with limestone trimmings, is briefly and practically described in the following summary, which will show that we have provided for every important item necessary in a building for the purpose.

SUMMARY.

Size of building, 102 by 71 feet 6 inches by 56 feet 6 inches.
Cubical contents, 393,761½ cubic feet.

Square feet of floor space:	Square feet.
Athletic department (basement)	2,561
Cellar and storage (basement)	2,614
Domestic department (ground and first)	2,660
Education and staff (ground, first, second, third)	3,379½
Hospital (first)	474
Administration (first)	210
Dormitory space for students—	
29 double rooms and 2 single rooms, providing for 60 students (3 floors)	8,296
Toilets and baths for dormitory (first, second, third)	811
Public halls, etc. (all floors)	5,367
Recreation on roof	2,377
Total	28,749½

I take this occasion to testify to the valuable assistance and cooperation of Dr. Percival Hall, the president of the institution, whose interest and labors aided to the greatest degree.

UNITED STATES BOTANIC GARDEN.

Mr. George W. Hess, superintendent, reports as follows:

During the fiscal year 1918 the annual distribution of plants, trees, shrubs, etc., by and through the authority of the Senators and Representatives in Congress, broke all records of previous years. Even with the shortage of employees caused by so many of the men being called to the colors, and others seeking employment elsewhere at a much higher rate of compensation, the work has progressed in a very credible manner.

In the early part of the year, five of the old antiquated boilers located in the cellar of the main conservatory were removed and replaced by two large, modern ones. These new boilers are of such a size and so installed that either alone will take care of the heating of the main conservatory except in very extreme cold weather. This gives us a system which is much appreciated, as it enables us to keep a boiler in reserve for an emergency.

We were very fortunate in securing from one of the Government establishments a rather new, large section boiler. This was used to replace two of the old boilers used in heating the range of houses on the east end of the Maryland Avenue portion of the garden.

Greenhouse No. 7, located on the Maryland Avenue reservation, was entirely remodeled. This house was in such a condition that a heavy windstorm in all probability would have carried the roof away. The old pipe frame was reset and embedded in concrete.

The foundation, walls are poured concrete, making a very strong and substantial base for the structure. This, in conjunction with all new woodwork and glass throughout, makes the structure an up-to-date greenhouse. Heretofore this house has been used as a storage place for various kinds of plants, but, owing to the fact that we are in need of more growing space, new heating apparatus and plant benches will be installed and the house used for growing plants for the congressional distribution. Relaying of the walks in the garden was begun this year, when the old asphalt paving around the Bartholdi fountain and the flower bed just east thereto were removed and replaced by new concrete pavement. This produces a decided improvement in the appearance of the garden. As much as possible of this work will be done each year until all of the old asphalt has been replaced. The room above the superintendent's office on Maryland Avenue has been fitted as an office.

The offices, packing shed, and other buildings on Maryland Avenue portion of the garden were wired for electricity by the Superintendent of the Capitol, who has charge of the lighting of the Botanic Garden. All other necessary repairs to the greenhouses, packing sheds, storerooms, etc., have been made from time to time.

Respectfully submitted.

ELLIOTT WOODS,
Superintendent U. S. Capitol Building and Grounds.

The SECRETARY OF THE INTERIOR.

APPENDIX.

EXPENDITURES.

Capitol Building and repairs, 1918.

Pay rolls and vouchers	$15, 562. 53
Gasoline supplies	682. 68
Machinery and ironwork	112. 96
Brushes, sponges, and soap	707. 21
Lumber and millwork	2, 358. 01
Hardware	2, 492. 85
Lime, brick, cement, and sand	11. 02
Paints, oil, and glass	2, 270. 02
Stone and marble work	377. 50
Legislative bell service	392. 07
Drawing, and blue-print material	282. 97
Repairs to ranges	372. 77
Hauling, telegrams, and express	18. 46
Plumbing material	1, 205. 00
Elevators and repairs	962. 92
Roofing and tin work	757. 35
Flags	699. 64
Traveling expenses	31. 06
Stationery and books	191. 13
Contingent expenses	129. 42
Reserved for unpaid bills	10, 382. 41
	40, 000. 00
Appropriated sundry civil act, approved June 12, 1917	30, 000. 00
Appropriated urgency deficiency act, approved Mar. 28, 1918	10, 000. 00
	40, 000. 00

Improving Capitol Grounds, 1918.

Pay rolls and vouchers	$23, 970. 00
Removing snow	1, 957. 50
Plants and seeds	572. 69
Fertilizers	690. 00
Tools and machinery	251. 16
Brushes, brooms, etc	213. 00
Soil and sod	50. 00
Motor and hand mowers	795. 07
Cement, lime, etc	6. 00
Plumbing material	27. 40
Paving and repairs	35. 28
Freight and express	7. 71
Hose and couplings	97. 00
Lumber	60. 43
Carts and harness	31. 50
Trees	21. 50
Shelter house	1, 265. 00
Reserved for unpaid bills	18. 06
	30, 000. 00
Amount appropriated sundry civil bill, approved June 12, 1917	30, 000. 00

Capitol power plant, 1918.

Pay rolls and vouchers	$74, 285. 48
General office supplies and expenses	13. 63
Power-plant building	831. 85
Miscellaneous power-plant equipment	1, 034. 49
Turbines and motor generators	33. 10
Switchboards and equipment	1, 732. 23
Boilers and stokers	7, 546. 40
Coal and ash-handling equipment	4. 00
Miscellaneous steam equipment	1, 302. 43
Pumping station and waterways	1, 381. 47
Electric transmission ducts, etc	51. 46
Electric apparatus and accessories	1, 144. 35
Wire and material	11, 399. 72
Fixtures	1, 686. 00
Incandescent and arc lamps	8, 233. 47
Hauling, express and telegrams	61. 16
Gas and electric current	813. 44
Fuel, oil, and waste	107, 373. 27
Travel expenses	142. 89
Reserved for unpaid bills	11, 278. 16
	230, 349. 00
Appropriated sundry civil act, approved June 12, 1917	195, 599. 00
Appropriated deficiency act, approved July 8, 1918	34, 750. 00
	230, 349. 00

Engine house, Senate and House stables, 1918.

Pay rolls and labor vouchers	$218. 80
Lumber and millwork	324. 23
Hardware	106. 69
Tinning and roof work	70. 00
Plumbing and material	145. 87
Brick, sand, and cement	3. 31
Reserved for unpaid bills	631. 10
	1, 500. 00
Appropriated sundry civil act, approved June 12, 1917	1, 500. 00

RECONSTRUCTION OF COURTHOUSE, WASHINGTON, D. C.

Statement of appropriations, expenditures, etc., to June 30, 1918.

Excavation	$4, 652. 67
Concrete footings and foundations	12, 338. 30
Rough brickwork	56, 260. 09
Exterior stonework, stucco, and main steps	54, 179. 79
Steel framing for floors, roof, etc	28, 387. 78
Fireproof floor construction, arches, etc	12, 240. 97
Terra-cotta partitions	4, 700. 46
Roof construction and skylights	17, 374. 92
Miscellaneous ironwork and stair construction	1, 100. 30
Elevators and inclosures	1, 928. 53
Steam heating	13, 410. 99
Plumbing and sewer work, standpipes, etc	28, 085. 50
Ventilation	2, 172. 26
Plastering and grounds	17, 596. 05
Windows, doors, jambs, sash, trim, etc	10, 232. 41
Electrical work and chandeliers	8, 067. 31
Painting	52. 50
Architects and engineers	14, 041. 00
Drafting material and blue prints	1, 057. 66
Office force, foremen, constructors, timekeepers, watchmen, etc	10, 705. 90
Traveling expenses	93. 18
Advertising and printing	86. 94

Technical books and instruments	$96.56
Telegraph, telephone, hauling	153.93
Contingent	106.39
Sheds, storehouse, tools, fence, etc	302.24
Preliminary (wrecking, demolitions, etc.)	31,033.27
Reserved for balance due on contracts, etc	19,542.10
	350,000.00
Appropriated, sundry civil bill, approved July 1, 1916	200,000.00
Appropriated, deficiency bill, approved Sept. 8, 1916	150,000.00
	350,000.00

NEW WOMEN'S DORMITORY, COLUMBIA INSTITUTION FOR THE DEAF.

Statement of appropriations, expenditures, etc., to June 30, 1918.

Excavation	$3,072.98
Concrete footings and foundations, including waterproofing	5,012.98
Rough brickwork, including waterproofing	18,720.90
Exterior stonework	3,453.15
Interior stonework and marble	7,135.00
Steel framing for floors, roofs, etc	15,507.52
Expanded metal	96.44
Concrete floors, arches, etc., including waterproofing	7,567.14
Terra-cotta partitions, etc	10,251.10
Roof covering and skylights	6,970.85
Iron stairways	4,499.65
Steam heating	5,957.92
Plumbing, standpipes, pool, etc	16,110.09
Ventilation	1.50
Plastering and grounds	9,439.26
Exterior millwork, windows, doors, etc	3,976.46
Interior millwork, windows, doors, etc	16,066.40
Glass and glazing	764.00
Finished flooring (linoleum)	4,496.10
Electrical work and chandeliers	4,588.57
Painting	1,580.35
Furniture, blackboards, etc	4,944.36
Paving, court, curb, and parking	579.33
Architects and engineers	6,125.00
Draftsmen and assistants	100.00
Drafting material and blue prints	112.67
Office force, constructors, foremen, timekeepers, watchmen, etc	9,383.74
Traveling expenses	23.21
Advertising and printing	15.65
Technical books and instruments	262.00
Telegraph, telephone, hauling	482.94
Contingent	404.67
Storehouse, tools, constructor's office, fence, etc	1,234.70
Temporary quarters	2,990.48
Preliminary (wrecking old building, etc.)	2,328.38
Reserved for balance due on contracts, etc	8,244.51
	182,500.00
Amount appropriated:	
Sundry civil bill, approved July 1, 1916	90,000.00
General deficiency bill, approved Sept. 8, 1916	53,000.00
Urgent deficiency bill, approved Oct. 6, 1917	21,000.00
Urgent deficiency bill, approved Mar. 28, 1918	18,500.00
	182,500.00

REPORT OF THE DIRECTOR OF THE NATIONAL PARK SERVICE

THE RESTORATION OF PEACE.

Department of the Interior,
National Park Service,
Washington, D. C., November 12, 1918.

Sir: With the war brought to a successful conclusion, the welcome announcement of which has come since this second annual report of the National Park Service was prepared, I foresee a great impetus to national-park travel during the coming summer. The travel of this year was within 93 per cent of that of 1917, but was maintained at that remarkable level at the height of the war by the influx of motorists in their own cars. If tourist rates by rail are announced in ample time before the season opens, it can safely be predicted that the combined railroad and automobile travel will insure to the national parks the greatest attendance and the most successful season they have ever enjoyed.

Progress is shown in carrying out the plans I have already laid before you to make one of the most interesting of the parks accessible in a larger way than ever before, and it only needs the United States Railroad Administration's early announcement of low excursion rates for next summer's tourist travel, with a continuation of the hearty cooperation is has already shown us, to make the plan an assured success. A number of projects for which appropriations have already been made will now be energetically pushed to completion by the National Park Service.

I believe, too, that Congress will consider favorably the starting of one or two important road projects which we omitted from the estimates for the next fiscal year on account of war conditions but which I propose to submit for your consideration in supplemental estimates. The people will assuredly turn their eyes longingly toward their great national recreation ground, and it behooves us to make every preparation to welcome them.

Very respectfully,

Stephen T. Mather,
Director.

The Secretary of the Interior.

ANNUAL REPORT OF THE DIRECTOR OF THE NATIONAL PARK SERVICE.

DEPARTMENT OF THE INTERIOR,
NATIONAL PARK SERVICE,
Washington, October 15, 1918.

Sir: At this writing the situation abroad seems to bring the close of the war within the limits of reasonable conjecture, and encourages me to look forward to the time, next season in all probability, when our interim work on the national parks may do its belated but none the less true and useful bit by furnishing recuperation to thousands who have given themselves ceaselessly and untiringly to the cause of peace by earnest labor for the success of the war.

Whenever this hiatus between the lapse of the war impetus and our resumption of national development may arrive, the parks will be ready with their calm and glorious beauty, their inspiration, and their marvelous recuperative gifts. There the tired war workers may give themselves without stint to the business of restoring minds and bodies in preparation for the great era of peace and reconstruction to follow.

I take pleasure in submitting to you the second annual report of the National Park Service. It covers the fiscal year ended June 30, 1918, in so far as financial matters and certain fiscal tables are concerned, but relates chiefly to the tourist season that has just closed and what has been accomplished since the date of the last report.

While war exigencies have curtailed travel to many of the national parks, and in several directions changed the course of our normal activities, it is gratifying to record that in the past year there have been important achievements in the development of the national park and monument system. Several of these accomplishments are especially notable because they have a very definite relation to the future progress of the great public work in which we are engaged.

THE NATIONAL PARKS POLICY.

Next to the organization of the National Park Service itself last year, the announcement on May 13, 1918, of the administrative policy that is to guide its activities is the most important event in the recent history of national park development. This statement of policy[1] sets forth these three fundamental principles which are to govern all of the activities of the National Park Service: "First, that the national parks must be maintained in absolutely unimpaired form for the use of future generations as well as those of our own time; second, that they are set apart for the use, observation, health, and pleasure of the people; and third, that the national interest must dictate all decisions affecting public or private enterprise in the parks."

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[1] Printed in full in Appendix G, p. 1074.

Proceeding on these basic principles your outline states that there shall be no commercial use of the national parks and monuments except such as may be specially authorized by law or incidental to the accommodation and entertainment of visitors. With reference to the specially authorized use of park lands for the grazing of live stock, as provided in the National Park Service act,[1] the stipulation is made that the grazing of cattle may be allowed in isolated regions not frequented by visitors, where there is no possibility of injury resulting to the natural features of the parks. The grazing of sheep is specifically prohibited.

Park lands leased for the purpose of operating concessions are to be no larger than absolutely necessary for the purposes of these enterprises. Summer homes in the parks are not to be permitted on the ground that all park lands are for the use of all the people and that access to all of the streams, lakes, and other points of interest or places of recreation must not be denied to anyone.

Timber only may be cut where it is needed for the improvement of the park and then only when it can be removed from the forests without injuring the landscape, or where it is necessary to protect the forests themselves from fire or insect depredations.

HARMONY OF BUILDINGS AND LANDSCAPE.

All of the improvements in the parks must be carefully harmonized with the landscape, and to this end engineers trained in landscape architecture or fully appreciative of the necessity for maintaining the parks in their natural state must be employed to supervise and carry out all improvement work. New improvements must be planned carefully and comprehensively in advance of execution.

The advisability of securing exclusive jurisdiction over all of the national parks is emphasized.[2] With reference to private holdings in all of the national parks, your statement of policy commits both the department and the National Park Service to their acquisition by purchase through congressional appropriation, or by acceptance of donation.

All of the parks and monuments are to be open to vehicles of all kinds, and facilities are to be provided so that tourists may visit and enjoy the parks in any manner they may choose. One of our chief duties is declared to be the encouragement in the national parks of all outdoor sports, except hunting and other activities which may impair the parks or injure their wild life. Recreational use of the parks is to be stimulated by any means possible. From the standpoint of education, classes in science are to be afforded special opportunities to study in the national parks, and museums containing specimens of their flora and fauna are to be established as funds are provided for this purpose.

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[1] Act of Aug. 25, 1916 (39 Stat., 535), sec. 3.

[2] The Government now has exclusive jurisdiction over parks in Arkansas, Oklahoma, Wyoming, Montana, Washington, and Oregon; also in the Territories of Hawaii and Alaska.

Concessioners in the parks must render service satisfactory to the department at carefully regulated rates. The general principle is laid down that competitive business should not be authorized when a concession is meeting our requirements. As contemplated by Congress the national parks must yield a revenue to the Federal Government. This revenue is to come principally from concessions and automobile fees. All concession charges are to be reasonable and must take into consideration the volume of business transacted by them and the hazards under which they operate. Automobile fees must be reasonable and not impose a burden upon the motorist.

COOPERATION OF GOVERNMENT BUREAUS.

We are advised to avail ourselves of the assistance of scientific bureaus of the Government in solving questions relating to the public health, the care of wild animals, the propagation and distribution of fish, and in the solution of other problems where scientific aid may be had for the asking.

Cooperation with the railroads, tourist bureaus, automobile and highway associations is authorized, to the end that information about the national parks may be thoroughly disseminated. It is also declared to be the duty of the National Park Service to keep informed of park movements and park progress at home and abroad. Close cooperation with the Dominion Parks Branch of the Canadian Department of the Interior is pledged.

Rules to be observed in passing on new park projects, and propositions involving additions to existing parks, are laid down. In analyzing new park projects we must confine consideration to "scenery of supreme and distinctive quality or some natural feature so extraordinary or unique as to be of national interest and importance," or "distinguished examples of typical forms of world architecture," in order that the dignity and prestige of the system as now established may not be impaired. These are the main subjects covered.

This platform is destined to go down in national park history as one of its most important documents; it is not likely to be modified greatly in the future because the fundamental principles it enunciates govern the future care and use of all of these reservations, as well as the present protection and enjoyment of them.

NATIONAL BUREAU OF RAILROAD SERVICE.

Another event of surpassing importance was the establishment, in Chicago, by the United States Railroad Administration of the Bureau of Service: National Parks and Monuments. This occurred on June 7, 1918. Mr. Howard H. Hays, manager of the touring department of the Union Pacific Railroad and Chicago & North Western Railway, was made manager of the new organization, with power to choose from the personnel of the various railroads tributary to the national parks and monuments a corps of assistants, each of whom would be thoroughly acquainted with at least one national park and all conditions affecting travel thereto.

The bureau was created to serve several purposes. In the first place, it was to preserve the close relationship that had been established during the past few years between the railroads and the National Park Service. It was to become the "point of contact between the Railroad Administration and the Bureau of National Parks, the concessionaires, and others interested in the promotion of travel."

Another important function was the coordination of all railroad activities looking toward the development of tourist travel. It was also expected to collect, publish, and disseminate information regarding the national parks and monuments and other resorts, and to distribute publications of the National Park Service. Again, it was to conduct a course of instruction in national park and national monument travel for the ticket agents, and especially those attached to large consolidated offices. Lectures were to be given whenever possible, and the motion-picture films and lantern slides collected by the various roads were to be used judiciously in the bureau's work.

On this basis the organization was quickly formed. Special reduced summer fares over the western lines to the national parks and the Pacific coast were announced by the Railroad Administration. The prospects for the usual travel by railroad seemed bright, especially in view of the possibility of these excursion rates being advertised to a considerable extent. War conditions, however, compelled the continuance of the policy, earlier adopted, to discourage traveling for pleasure. It was deemed best, therefore, not to advertise national park tours and although the reduced fares remained effective throughout the summer they were not brought to the attention of the public, and could only be ascertained upon inquiry of railroad officials.

The new organization was, in view of this policy, considerably circumscribed in its activities. It did, however,. distribute a vast quantity of publications already on hand in the passenger departments of the various railroads, and all of the circulars of the National Park Service that could be delivered to its offices. The manager kept constantly in communication with me, and our relations were most cordial and inspiring.

Touring Inquiries.

All requests for information regarding national park tours addressed to this Service, except those submitted by motorists, after receiving attention here, were forwarded to Chicago in order that our replies might be supplemented by definite data regarding train facilities, time schedules, and rates. This course is still pursued in handling correspondence, and is proving very effective.

The Bureau of Service has also accomplished much during the summer in the way of getting information regarding the national parks and monuments into the hands of the ticket agents of the country. Two comprehensive and very interesting circulars were issued to the agents, and, wherever possible, personal conferences were held between them and members of the Bureau of Service staff.

ANALYSIS OF THE SEASON'S TRAVEL.

Travel to the national parks and monuments during the past season does not, according to the total figures for the entire system, indicate an appreciable reduction in the number of people visiting these reservations. Taking the year as a whole, the loss as compared with the high record of the year before is less than 8 per cent.

This surprising development of a year when war restrictions on railroad travel were expected to reduce importantly the public use of the national parks is partly accounted for by an increase in the winter patronage of Hot Springs before the Government actively discouraged railroad travel. Of course, if an object were merely to gauge the real influence of the discouragement of travel by railroad we should consider only such parks as Rocky Mountain, Yellowstone, and Glacier. These great national parks, located at a considerable distance from the center of population and from large cities not immediately tributary to high mountain areas, depend upon railroad facilities for a large percentage of their summer travel. To a certain extent motor traffic varies with railroad advertising. With the elimination of all advertising expenditures and the active discouragement of railroad travel last spring these big parks in the Rocky Mountains suffered also a serious decrease in tourist travel as compared with the year before. It is interesting that in each case the losses bear approximately the same ratio to 1917 travel.[1]

As regards the Pacific coast parks, there was an increase in automobile traffic in Yosemite, Crater Lake, and Mount Rainier, and a decrease in Sequoia and General Grant Parks. The decreased travel was due largely to the fact that certain approach roads were closed to facilitate the progress of reconstruction work. Travel by railroad to all of these parks, however, was considerably reduced, and in the case of Yosemite Park the reduction in railroad patronage was so great that the increase in motor traffic was insufficient to bring the total travel up to that of last year, hence its loss of 1,000 individuals.

OTHER CAUSES OF DECREASED TRAVEL.

It is only fair to note that the decrease in motor travel to the parks in the Rocky Mountains was as much due to labor conditions at home as anything else. Business and professional men and farmers in the Middle West who come to these parks in large numbers during normal seasons were kept at home this year on account of the necessity for giving personal attention to their affairs. The closing of the Yellowstone hotels probably discouraged traffic to a certain extent, but this influence was of little importance aside from the assumption that prevailed for awhile at the opening of the season that the closing of the hotels was tantamount to closing the park. It was never proposed to close the ample public camps.

Park travel suffered also from the great decrease in organized tour business which was in large part due to the consolidation of ticket offices in the larger cities, and the discontinuance of the sale of tickets by tourist agencies. Opportunities for obtaining accurate information regarding tourist resorts, where full arrangements for tickets and other accommodations could also be made, were removed when these agencies were parted from their railroad connections. This naturally discouraged tours by the class of people that is accustomed to traveling in parties with all expenses paid and no difficulties of any kind to anticipate. Despite the unusual conditions, the tourist agencies were able to organize and personally conduct some tourist parties. In the case of each party that has come to my attention, the agent was in a marked degree successful.

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[1] See travel statistics in Appendix C, p. 1004.

The personally conducted saddle-horse tours also were patronized less this year than last. Howard Eaton conducted one party of about 60 through Glacier National Park, but his Yellowstone trip had to be abandoned.

PARK ROADS IN GOOD CONDITION.

The roads in the national parks were, generally speaking, in better condition during the 1918 season than last year. While funds have been available to maintain them in this condition, labor has been so difficult to obtain and hold that before the season drew to a close in many parks the highways showed considerable deterioration. They will be restored, however, as soon as the farms release more men for mountain work. In some parks, notably Yellowstone, swollen streams accomplished considerable injury to roads during the spring, thus requiring much expensive reconstruction work to make them passable and thoroughly safe.

In practically all of the parks a marked increase in the number of motorists using their own camping outfits was noted. We have continued to improve camp grounds wherever men could be spared for this work, but not as much was accomplished in this direction as had been planned.

In all of the parks except Hot Springs and Mount Rainier, hotel and camp enterprises were affected detrimentally by travel conditions. Likewise the transportation companies in most parks suffered a considerable loss of business. Even in Mount Rainier National Park, with its large percentage of increase over any previous year's travel, the very extraordinary increase in private motor camping parties deprived the hotels and permanent camps of an increase of business proportionate to the increase of total park travel. The hotels of Yellowstone Park were not opened during the season, and three of the permanent camps of the Yellowstone Park Camping Co. were not used. In Glacier Park, several chalets were not operated for the first time since their construction. These retrenchments in both Yellowstone and Glacier Parks were absolutely necessary to the protection of the owners of the properties involved. In both parks, however, ample accommodations were afforded the traveling public, and there was exceptionally little criticism of service rendered.

Roads leading to the national parks were generally in good condition, but not up to the standard of last year. Unrepaired damage, caused by the storms of last winter, or failure to do ordinary maintenance work, in other cases, were responsible for these conditions.

PARK-TO-PARK HIGHWAYS.

The important highway associations continued their work during the year. The action of the Lincoln Highway Association in placing in its guidebook definite information regarding travel from the Lincoln Highway to Yosemite Park via the Tioga Road, and explaining, in greater detail, the routes leading to Yellowstone Park from the highway was very gratifying.

The work of the National Parks Highway Association, with headquarters at Spokane, Wash., has continued, with good results. A vast amount of informative matter has been distributed by the association. It has not, however, continued the designation of its route south of Crater Lake Park. As mentioned in last year's report, this highway was signposted as far as Crater Lake during the 1917 season, and now connects Yellowstone, Glacier, Mount Rainier, and Crater Lake.

The National Park-to-Park Highway Association, with headquarters at Cody, Wyo., has continued advocating the completion of the designation of a park-to-park highway and has kept in active correspondence with the highway officials and communities interested in interstate road development in all of the States through which this highway will eventually run.

It is interesting to record the change made in the name of the Spanish Trail Highway Association. At a meeting of the association held in Durango, Colo., on August 5, 6, and 7, 1918, it was decided to change the name to the Spanish Trail-Mesa Verde Highway Association, and this action was taken by unanimous vote of the delegates present. At this convention the association accepted a proposal of the National Old Trails Road Association to declare the route of the Spanish Trail-Mesa Verde Highway the summer route for automobile traffic en route to Los Angeles from the east.

The energetic development of the Glacier-Yellowstone Bee Line Highway connecting the northern gateway of Yellowstone Park with the eastern gateway of Glacier is a notable achievement that should not be passed without favorable comment. Considerable improvement work has been done on this road during the past year, and the cities along the route have given much publicity to its interesting scenic features.

A REAL INTERPARK SYSTEM.

I am still deeply interested in the idea of designating and developing a great interpark road system, which may be used by motorists from all over the Nation. There are hundreds of thousands of car owners in the Eastern and Middle Western States who expect to visit one or more of their big recreation grounds at the first opportunity that may present itself. In the normal case, the time available for a park trip will be limited. For this reason there must be direct, well-marked routes across the plains to points on a park-to-park highway, which has been designated with the idea of giving the traveler a chance to see as much as he can in the shortest possible time and of bringing him to his national-park objectives with a minimum of inconvenience. In order that the tremendous value of this interpark highway from the standpoint of publicity may not be impaired, it should not be encumbered with a multiplicity of side trips and detours to regions not comparable with the scenery and recreational facilities of the parks and monuments. Only well-improved highways of recognized scenic or historic importance, directly tributary to the park-to-park road—such, for instance, as the Columbia River Highway, the Denver Mountain Park Road System, the Pikes Peak Highway, and the Tahoe-Yosemite " loop "—should be included as side trips. In some sections of the West alternate routes, of course, may have to be provided in order to make all of the parks and monuments accessible.

It is not unlikely that in the development of this automobile road between the parks, the Federal Government will have to assist in constructing certain links of the chain. Necessarily the road will have to traverse some sparsely settled States, with relatively little taxable property to provide funds for its construction and maintenance, and in such States Federal aid should be forthcoming. An instance in point has recently arisen. Senate bill 4439, by Senator King, proposes to survey a national highway connecting Mesa Verde National Park and the monuments of Southern Utah with the Grand Canyon in Arizona. You reported favorably on this measure on the ground that unless the United States builds a highway between these points there may never be any road constructed. Much of the land belongs to Indians and all scenic areas are in national reservations; futhermore the few settlements in the region could never raise sufficient funds to undertake an enterprise of this magnitude nor could the States involved assume such a burden.[1]

One of the important afterwar projects deserving the attention of municipalities, counties, and States of the West, as well as the Federal Government, is the park-to-park highway.

IMPORTANCE OF RECREATIONAL TRAVEL.

I sincerely trust that it will not be necessary to continue the policy of discouraging recreational travel next year. Whether this policy will be discouraged or not, of course, must depend upon the emergencies of the war. It would seem that as soon as possible tourist travel not only should be sanctioned but heartily encouraged. In the first place, the tremendous strain of war activities should be relieved by periods of rest and recreation, in order that renewed vitality and increased strength may be available for the vigorous continuance of war activities until the end of the struggle is at hand. If these periods of diversion can be afforded by the country and the individual war worker himself, it should be the function of this Service and the travel bureau of the Railroad Administration to aid in arranging national park and other tours that will insure the greatest benefit and pleasure in each particular case. Excursion rates to winter resorts for the season that is approaching have been announced by the Railroad Administration and tentative assurances have already been conveyed to us that summer excursion rates to the national parks and monuments will be announced early in 1919 for next year's travel. The principal question that remains to be considered, which, of course, can not be decided at this early date, is whether or not war conditions will permit the active stimulation of passenger travel, by advertising and other means formerly available to the railroads, in the promotion of national park and other tourist traffic.

In the second place, it is highly desirable that, at the earliest practicable date, the ban should be lifted on travel for pleasure in order that the effect of the important work accomplished by this department and by the railroads during the past four years in attracting the attention of America to its great scenic possessions, and informing the people of the country of the ways and means of reaching and enjoying these great national recreational areas, should not be lost. From the economic standpoint this is of preeminent importance.

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[1] See report on this bill, p. 1045.

The national park and monument system is one of America's greatest assets, and it must not be overlooked in planning the development of American industry after the war. Our work in cooperation with the railroads since the season of 1914, when Americans were last privileged to go to Europe, has resulted in bringing thousands of citizens of this country to a complete realization that this Nation possesses natural features unsurpassed anywhere in the world and that the national park system includes scenic areas so wonderful and yet so very distinctive that a tour of the entire earth would not bring opportunities to gaze upon their equal.

NEED OF A NATIONAL TOURING DIVISION.

This work has just begun, however. If it is to be continued after the war, as it certainly should be, funds should be provided for the establishment of a touring division in this Service and authority granted to exploit, not only the recreational and educational advantages of the national parks and monuments, but other natural features of national interest and importance to the end that hundreds of millions of dollars of American wealth may be expended in this country, instead of abroad.

The war has brought a great national awakening. The extent of our resources has amazed us. We have surprised ourselves by our accomplishments. If this tremendous eye-opening could also comprehend the magnificence of America's national parks and their potential economic value, the national conscience would experience other thrills of pride and amazement. Canada long ago measured the economic importance of her superb mountains and promoted her own national parks with such energy and enthusiasm that already the people of the United States know them as well and possibly better than they do their own national parks and monuments, which are, by the gift of nature, vastly larger and more distinctive. France, Italy, and other European countries, even in the dark days of the struggle with the Hun invader, have been looking forward to the coming of the tourist in the bright day of peace. France has a government tourist bureau, which is actively planning for the accommodation and entertainment of future tourist travel. It is accomplishing big and important work. The press is giving it assistance, and La Renaissance, one of the best known journals of the Republic, is now regularly publishing a supplement called "La Renaissance du Tourisme" devoted to travel. (Mention should not be made of this exceedingly interesting supplement without an expression of our appreciation of the series of descriptive articles on our national parks that have been printed in recent numbers of this magazine.) In Italy the question of the establishment of a government tourist bureau has been earnestly advocated by far-seeing public officials and writers.

Spain's national park activities are noted elsewhere in this report.[1]

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[1] See p. 841.

OUR INFLUENCE FELT ABROAD.

That the Orient is tremendously interested in the development of tourist business is best indicated by the advertising matter issued by the Toyo Kisen Kaisha (Oriental Steamship Co.). A pictorial chart of the noteworthy places in Japan is one of the most interesting productions of this company. Here again we find an expression of interest in the national parks and national monuments of this country; the steamship company has included among its publications a chart showing the interesting places of the United States with practically all of the national parks included.

During the year, publications issued for the purpose of stimulating travel in Australia and New Zealand have also come to my attention.

In almost every instance where a foreign country has considered the importance of tourist travel it has laid its plans for developing this business on a very much broader scale than we have been able to do. My plea then is simply this—in reorganizing, developing, and protecting American industry, now and after the war, our Government must not overlook the encouragement and promotion of American travel.

IN TIME OF WAR PREPARE FOR PEACE.

The importance of promoting the early realization of this enormous national asset has had our earnest consideration during the year just past. This realization will follow quickly upon the general education of the people to the travel facts of their own land. This done, peace and the natural working out through business channels of the laws of demand and supply will do the rest.

Already heavy increases in national-park travel have followed upon our educational efforts of the several years preceding the war; and the war has scarcely checked them. But these have been the merest beginnings. The opportunity and demand for information, now at its height, is destined to leap into great dimensions as the close of the war becomes more and more evident. In time of war prepare for peace. To this end we distributed pamphlets and other national park literature covering a territory as wide as the land. "Glimpses of our National Parks," after an enormous circulation in its second illustrated edition, is passing into a third edition, enlarged so as to include all the national parks and the national monuments. The National Parks Portfolio will soon pass into its third edition, this brought up to date and enriched by many additional pages of illustrations.

A supplementary school reader, by a staff member of the National Parks Service, which is intended to make national parks attractive to school children, has been published in New York, and is beginning to find favor among the public schools throughout the country. We believe that if we get the lesson into the minds of the school children, the future of the national parks will be safe.

The enormous war demands upon the Government Printing Office have naturally limited the publication of special pamphlets. Dr. Willis T. Lee's "Geologic Story of the Rocky Mountain National Park," which is much more interesting and popular than its title indicates; Vernon Bailey's "Wild Animals of Glacier National Park," including an account of the birds by Florence Merriam Bailey; J. S. Diller's "The Volcanic History of Lassen Peak"; and George B. Dorr's "Two National Monuments," treating Zion and Sieur de Monts, have been issued, and our first publication devoted strictly to mountaineering will shortly come from the press.

This book is entitled "Mountaineering in the Rocky Mountain National Park," and was compiled by Maj. Roger W. Toll of the Colorado Mountain Club, and edited by Robert Sterling Yard, of this Service. It is a complete guide to the mountains of the park and the adjacent region for novices as well as experienced climbers; for the latter it contains all data necessary to plan and execute the most arduous climbs in these high and rugged mountains. Maj. Toll has been on many climbing expeditions in this region, and he has compiled his data out of the abundance of his own experience, as well as drawing on the exploits of his friends and associates of the Colorado Mountain Club.

This book will be followed, in due course, by similar volumes on the other large parks.

FILMS, SLIDES, AND PHOTOGRAPHS.

In addition to publications, the Service has made as wide a circulation of motion-picture films and lantern slides as its limited supplies and the congested condition of the national express service would permit. It has not been able, however, to distribute as many national park photographs for publication as usual, because of the failure of the supplies; the demand, be it noted, was there.

This failure of supplies was due principally to the inability of the western railroads under wartime restrictions to furnish us photographs. Congress has never specially appropriated money for publicity and educational purposes, but up to this year we have kept fairly abreast of the rapidly growing demand by the distribution of photographs to newspapers and magazines which the railroads gave us for the purpose. It is a great pity to have this wholesome demand die for lack of material. The National Park Service has hundreds of splendid negatives at its disposition and lacks only the modest appropriations which would release these magnificent pictures, many of which have never been published, to the magazines and the press of the country.

A similar condition limited last year the circulation of national park lantern slides, all of which in the past have been furnished by the railroads. The demand, meantime, is scarcely lessened, even by the extensive war propaganda.

Naturally, the year has seen a falling off in the national park lecture field, practically all of the many private lecturers whom we formerly assisted with information and pictures having patriotically entered the national war propaganda. A number of important lecture engagements were, however, filled by members of our staff, and extensive progress was made toward the perfection of a lecture service to be promoted at the close of the war.

Our attempts to interest university extension in the national parks attained some success during the year, the University of the State of New York having definitely entered the field. This is the first result of a campaign of more than two years. Several other universities are favorably disposed and may enter the field during the year.

The earnest efforts of the National Park Service, not only to advertise the recreational and inspirational uses of the parks, but especially their educational uses, are very slowly but surely reaching fruition.

TRAVELING EXHIBITS OF NATIONAL PARK PICTURES.

The Service has been unable during the last year to secure any more sets of the framed enlargements of national-park pictures. The set already in its possession, however, 25 framed pictures, 25 by 30 inches, fitted into specially constructed boxes, has been widely circulated. It is now in the possession of the university extension courses of one of the progressive States of our great Middle West for exhibition in the libraries of the State and at such other places as in the judgment of the university may prove instructive and valuable. The university has agreed to keep the collection on constant exhibition.

A manuscript containing a comprehensive description of each picture was prepared in the Service and sent to the university, which issued copies for distribution to those interested. In view of the present transportation situation it is believed the collection will receive a wider circulation in this way than by dealing directly between the Service and the individual organization wishing to exhibit it.

SCHOOLS OF NATURAL SCIENCE.

The National Park Service has continued during the year to give special attention to the educational work undertaken several years ago. A large quantity of publications relating to the national parks have been introduced in the public schools of the larger cities, and wherever possible in smaller communities, for the use of teachers in classes of.geography and general science. The demand for our publications, particularly the Portfolio and Glimpses of Our National Parks, by teachers and school children has been enormous. Here is another real opportunity to inculcate patriotism in the growing child. Teach him that here in America the creative forces of nature that are busy building and modifying the earth's surface are seen to best advantage in the national parks and monuments, and that here nature has accomplished her most sublime works, making abundant use of pictures in these courses, and the child will thrill with pride in his native land. Later, as he reaches maturity he will seek the Nation's playgrounds to see these wonders for himself. I know of nothing that will give an American such a sense of supreme happiness and satisfaction as the contemplation of a national park wonder with the thought that it belongs in part to him, that it is protected by his Government for his use and enjoyment, and that it will continue to be safeguarded for his children and his children's children.

This educational work must be continued and extended as fast as practicable. I want to see pictures of American mountains, geysers, glaciers, and canyons in every classroom of geography in the land; I want to see the beautiful pictures of national park scenes placed in the school houses with portraits of national heroes and views of historic places; I want to see text books in certain subjects made more truly American by referring to features in our national park system rather than similar natural objects in foreign lands. Other nations have long ago recognized the value of the American schoolroom as a place to build business for the future, and they have abundantly used their opportunities.

In expressing these aspirations, I should explain that the Federal Government, in my opinion, is not to be expected to assist in this educational work to the extent of furnishing the pictures. Its function is to demonstrate, promote, and advise in matters of this character.

TO EDUCATE NEW AMERICANS.

In a campaign of Americanization of aliens, the literature relating to the national parks and monuments can undoubtedly be used to great advantage. The Commissioner of Education now has under consideration an experiment to determine the extent of its influence.

In the parks themselves, the opportunities for field classes of the higher institutions of learning to engage in research work are unsurpassed. Already they have been utilized to some extent by classes in geology, botany, biology, ethnology, and anthropology, with most gratifying results. Renewed encouragement of research activities of this character will be forthcoming as soon as the universities are again on a normal basis.

At present this educational work is not conducted in accordance with any carefully developed plan. There is no money available to undertake this in a big way, nor have we the necessary funds now to properly prepare a broadgauge program for future use.

As soon as the exigencies of the war will admit of taking up this, and the program relating to the encouragement of travel by the establishment of an official touring division, Congress should be requested to appropriate the modest sums necessary to carry them out on a scale that will bring the full measure of benefit to the country.

ASSOCIATIONS WORKING IN HARMONY.

The National Park Service is fortunate in enjoying a close relationship with all of the important mountaineering clubs and through the Associated Mountaineering Clubs of North America we keep in closest touch with their activities. It is our purpose to work hand in hand with this organization and its member clubs in encouraging the hardy sport of mountain climbing and all forms of outdoor recreation to which they are devoted. To this same end, the Dominion Park administration is also working in Canada. The Associated Mountaineering Clubs is now composed of 22 organizations with a total membership of considerably over 20,000. The names of the clubs and their officers are given in Appendix G. The general secretary of the association is Mr. Le Roy Jeffers, of New York, one of the best known and most experienced mountain climbers of our time.

Another organization of national scope, the birth of which at this time strongly indicates the tendency of public thought, came into existence last June under the name of the National Parks Educational Committee. Its chairman is Charles D. Walcott, Secretary of the Smithsonian Institution; its vice chairman, former Congressman from California, William Kent, who gave the Nation the

Muir Woods; and the chairman of its executive committee, Henry B. F. MacFarland, of Washington, D. C. The presidents of a score or more universities and the active officials of many public-spirited associations, mountain clubs, and public institutions are among its members.

RESTORING WILD LIFE IN AMERICA.

The National Park Service holds no one of its several public charges in greater reverence than the care, maintenance, and development of the wild animals which live free and normal lives within its reserves. These animals are an exceedingly important part of what is left of that vast heritage of wild life which the march of civilization and the ruthlessness of former generations have elsewhere destroyed. In the Yellowstone National Park, where a quarter century of protection has largely repaired the ravages in a region which was still heavily stocked when protected, and in the Mount McKinley National Park, in Alaska, established before hunting reduced the great herds of game animals, we still have nature at her best. But in the other national parks, where help did not come until the wild life was nearly destroyed, it will take generations to restore the lost conditions.

Having always in mind the important fact that a national park must overflow with animal life, as Yellowstone and Mount McKinley overflow, before becoming, from the game standpoint, helpful to the neighborhood and Nation, it is our earnest care to avoid mischievous setbacks to the steady progress of natural breeding and healthy development. In this and other respects the year just closed, although the most perilous in the history of wild-life conservation in America, has been highly successful.

In practically every park substantial increases of the important species of wild animals abounding therein have been noted. In the Yellowstone a normal winter made the care of the elk and antelope herds relatively easy to accomplish, and there was only the usual loss through natural causes.

In several of the national parks, the efforts of our superintendents and rangers to develop the wild animal herds, particularly deer, failed to bring the fullest results because the winter ranges lacked protection across their borders. To help us bring these herds back to normal strength, game refuges should be established by the State of California around the west and south boundaries of Yosemite Park; by Oregon, adjacent to Crater Lake Park; and by Washington on the west and south sides, and perhaps other sides, of Mount Rainier Park. As recommended elsewhere, the boundaries of Yellowstone, Crater Lake, and Sequoia National Parks should be extended in certain directions in the interest of wild life protection as well as for the purpose of adding importantly to their scenic features.

In Glacier National Park, increase of predatory animals has made necessary an intensive campaign for their destruction. This is now in progress, under the direction of the superintendent of the park and an expert of the Biological Survey, in accordance with a cooperative plan developed by the Chief of the Survey and myself.

A NEW AND INSIDIOUS PERIL.

In addition to the usual difficulties of maintaining the normal development of our wild-life resources, war brought new perils of a very grave and insidious kind. Proposals were made that the elk and buffalo herds of the Yellowstone should be killed for meat, that organized hunting parties should be permitted to enter the parks at certain times of the year for the purpose of augmenting the food supply, that the needs of the animals be disregarded and domestic stock be given their range, and so on. Some of these proposals were vigorously promoted, and in almost every case the support of the Food Administration was sought.

At the same time, movements were initiated in various sections of the country which had for their purpose the suspension or modification of the general game laws, including the migratory bird act, in order that game might be killed in abundance for the alleged purpose of increasing the food supply, but for the real purpose of enriching an ambitious profiteering class.

The Food Administration considered these questions and promptly reached a conclusion that the integrity of the game laws should be preserved. In fact, the idea of making them more rigid was impliedly approved. We quote:

> The problem of providing for the country a maximum supply of game as food has been carefully considered by the Food Commission. It has reached the conclusion that this maximum supply can best be obtained by constantly increasing the breeding reserve of game under present and even more progressive laws directed toward that end.

This is the beginning of a decision that will ever be a distinguished document in the history of game protection.

FOOD ADMINISTRATION'S FAR-SIGHTED ATTITUDE.

Other vigorous paragraphs follow:

> Any effort to weaken the present laws or in any way relax them in one locality would immediately lead to a demand for such relaxation of laws in all other localities, insuring a rapid breakdown of the whole legal structure of present game protection erected after efforts extending over numerous years. Once the perfected laws were relaxed to the point where game could be killed more freely, notwithstanding the fact that numerous gunners have gone to war, the game would be quickly destroyed by largely increased numbers of local gunners using modern methods of transportation, such as automobiles, motor boats, trolley roads, and improved firearms.
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> The present game supply of the country should be considered in exactly the same way as that of domestic stock and fowls, the breeding reserve of which should be increased to insure increased supplies for food. This is even more necessary for much of the wild game, since once it is destroyed to a certain point it will decrease under natural conditions to extinction and can never, as in the case of domestic stock, be restored.
>
> To advocate the relaxation of State game laws would secure neither uniformity in action or results since State legislatures can not be brought to exactly the same views, and most of the States will not have regular sessions for another year. Since an attempted relaxation of laws would tend toward a rapid destruction of game, no emergency has as yet arisen sufficiently acute to warrant the Food Administration advocating the destruction or impairment of game, which forms a valuable national asset.

So far as the parks were concerned, however, the most menacing of these threatening forces of destruction was the attempt to introduce sheep within their boundaries. This danger, like the sword of Damocles, hung over both the scenic features and wild life of the parks.

DETERMINED SHEEP RAIDS DEFEATED.

Determined efforts were made by sheep owners in several western States to secure grazing privileges for their herds in the national parks nearest their places of business. The first attempt to force this issue was made in the State of Washington by an official of the Commonwealth who urged that Mount Rainier National Park should be opened to sheep grazing in order that the supply of wool and mutton might be increased during the war period. The idea was pressed vigorously in the face of our determined opposition to its advancement, and of our announced policy, approved by you, that sheep would not be allowed in any national park. Finally, when it became apparent that time was being utterly wasted by discussing this question with officials of this department, an appeal was taken to Food Administrator Hoover, who promptly considered it with the attempt to secure the adjournment of the game laws of the country during the war, and announced his entire lack of sympathy with all propositions of this kind.[1]

Thus ended the attack on the "Wild Flower Park."

Later, however, sheepmen of California sent a delegation to Washington to urge the granting of permits for grazing of sheep in Yosemite National Park. The men composing this delegation were met with a firm yet courteous refusal to yield to their petitions, and after a full and frank discussion of the policy involved, they accepted the decision and returned home.

In May, Oregon wool growers sought a permit to graze 7,000 head of sheep in Crater Lake Park. Their request was promptly denied. Many years ago, before the creation of this park, the lower slopes of ancient Mount Mazama and the entire area now reserved and dedicated for park purposes were utilized for the grazing of sheep with the result that the flora of the region was practically destroyed. After the lapse of a quarter century flowers are still exceedingly rare, and it will require the expenditure of much time and money to restore even a small portion of its lost species of plant life. Few places accessible to the public today illustrate more forcibly the destructive action of sheep grazing on high mountain lands than does Crater Lake Park.

The last, yet one of the most determined and sustained attempts to gain sheep grazing privileges in the national parks was made in July by Montana wool growers who sought land in the flower carpeted valleys of Glacier Park. The claim was made that owing to the long continued drought thousands of sheep would die if these valleys could not be secured. It was quickly shown that there were other grazing areas available, although, perhaps, not so easily accessible, and all applications were denied. The havoc that sheep would have wrought in one season in Glacier Park would have been astounding, and the injury accomplished would have been irreparable.

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[1] Food Administration Memorandum of Jan. 9, 1918: "The U. S. Food Administration concurs with the Department of the Interior that the Government's policy should be to decline absolutely all such requests" (requests for sheep-grazing permits).

MOUNTAIN CLUBS TO THE RESCUE.

An example of the intense feeling this sheep-grazing problem engendered during the past year is found in the letter of protest, filed by the Mountaineers, the great outdoor organization of the Northwest, which stated that rather than have Mount Rainier National Park opened to the pasturage of sheep, its members would sacrifice their lawns and flower gardens for this use.

Strong opposition to any sheep grazing in the national parks was also voiced by the Sierra Club Bulletin, the important sporting and outdoor magazines, and many large newspapers in widely separated parts of the United States; also by the official organ of the General Federation of Women's Clubs.

I do not doubt that, next year, there will be further efforts to secure sheep-grazing permits in national parks, and the necessities of the present struggle again will be put forward as a barrage to hide the personal and private interests of the applicants. Any argument that the use of the national parks will noticeably increase the production of wool or meat is ridiculous beyond expression; the map herein[1] showing the relation of the national parks and monuments to the vacant public lands and national forests will visualize the exceedingly small area reserved for park purposes and plainly indicates that under no circumstances could any benefit accrue to the Nation by the use of its parks for sheep range. The statistical tables which this map accompanies are also highly enlightening on this and other subjects.[2]

Cattle grazing was permitted to a reasonable extent in several national parks. In some, such as Yosemite and Glacier, which are in normal years used by tourists to the absolute exclusion of other interests, this grazing has been permitted solely as a war emergency measure, and will be discontinued as soon as peace returns. In others, under your approved policy, the pasturage of cattle will be continued wherever this use will not in any manner impair the scenic or other natural features of the parks, or place any restriction on, or cause inconvenience to, people using them for purposes of pleasure, rest, and recreation. By law Yellowstone National Park is closed to grazing. Were this law not on the statute books this region could not be used for domestic stock range, because almost every acre of it is required for the great numbers of wild animals that roam within its protecting boundaries.

THE MIGRATORY-BIRD TREATY RATIFIED.

It is a matter of national congratulation that the migratory bird treaty, concluded in 1916 between the United States and Great Britain, has been ratified by Congress, and that the President's proclamation of July 31, 1918, regulating the killing of migratory birds is now in full force and effect. Very many of the birds which are the choicest denizens of our national parks during a part of each year stop there in course of passage back and forth between their breeding places in the North and their winter homes in the South.

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[1] Map is opposite p. 1007.

[2] See pp. 1006 and 1007.

The gradual but sure lessening in the numbers of these birds during recent years is calamitous, not only from the æsthetic but also from the economic point of view. Many of these birds are our principal insect exterminators, and their preservation is necessary for the protection of the Nation's farming interests. This treaty is progress of the best kind.

INCREASING APPROPRIATIONS.

The sundry civil act of July 1, 1918, carries a total appropriation of $1,012,205, of which $50,000 is to be expended in the construction and improvement of the roads of Crater Lake National Park by the Engineering Corps of the United States Army.

Among the special improvements authorized are the construction of a new administration building and free bathhouse on the Hot Springs Reservation, the construction of a new road to avoid the so-called Gardiner Slide in the canyon of the Gardiner River in Yellowstone National Park, the continuation of the reconstruction of the El Portal Road, and the building of a new bridge over the Merced River at the Sentinel Bridge site in Yosemite National Park, the building of a new bridge over the Marble Fork River in Sequoia National Park, and a new approach road to the Mesa Verde.

On July 1, 1918, the revenues of all of the national parks with the exception of Hot Springs Reservation reverted to the Treasury of the United States. These receipts are therefore no longer available for expenditure in the maintenance and improvement of the parks from which they arise. In making appropriations for the current fiscal year, however, Congress took into consideration the fact that a reversion of these revenues to the Treasury hereafter would make larger appropriations necessary and acted accordingly. The revenues for the fiscal year ended June 30, 1918, were the largest in the history of national park administration, reaching the grand total of $217,105.55. These figures may be compared with the revenues of the 1917 fiscal year which totaled $180,571.05. The receipts of the parks for the current fiscal year will, of course, be considerably reduced on account of the decrease in travel to several of the largest revenue producing parks. At the present time it is quite impossible to predict what the total of this fund will be, but the indications are that it will exceed $150,000, and it may be in excess of all previous years except the record fiscal year of 1918. Detailed statistics relating to the appropriations and revenues of the national parks and monuments are contained in Appendix C.

By providing ample funds for the administration and maintenance of all of the areas under our jurisdiction Congress has indicated again this year in unmistakable terms its policy to keep them available for the use and enjoyment of the people during the war, and to insure the protection not only of their natural features but also of their improvements from injury and depreciation during this period.

During the continuance of the war it will be our purpose to recommend the appropriation of sufficient funds for retaining the national parks and monuments in their present condition.

THE ERA OF SPLENDID GIVING.

This is an area of splendid giving. The amount of money received for public purposes from the sale of liberty bonds and from taxes as they accrued has been made known to the country. The gifts of time and valuable property, both tangible and intangible, will never be known. They can not be counted nor estimated. They can not be returned, nor can any compensation be offered other than the thanks of a grateful nation expressed through its governing officers.

It is true that most of this giving has been in the interest of the war, but it began long before our entrance into the great struggle and, in my opinion, it will be continued after the conclusion of peace. Before the war, however, there was little giving to the Federal Government, due largely to the fact that special acts of Congress authorizing the acceptance of gifts of any kind, except the gratuitous devotion of time and human energy, to Federal interests was necessary before donated property could be taken over and used. Even gratuitous service had to be nominally paid for. This policy of Congress was maintained wisely because there was always the danger of having some useless, perhaps even valueless, thing transferred to the Government to maintain at public expense.

From time to time during the past few years of our administration of the national parks Congress has authorized the acceptance of patented lands and rights of way over patented lands in the national parks. In the case of Glacier Park it authorized the acceptance, during the fiscal year ending June 30, 1918, of buildings, moneys, or other property that might be useful in the betterment of the park.

Under these authorizations property of large value was acquired for the Government without the expenditure of public funds. The parks involved, of course, benefited enormously. I believe that in the future we will be able to secure by donation for the national park and monument system additional property that will be invaluable in developing and promoting these reservations. I am therefore recommending that the following proposed legislation be submitted to Congress at the proper time:

> Hereafter the Secretary of the Interior in his administration of the National Park Service is authorized, in his discretion, to accept patented lands, rights of way over patented lands or other lands, buildings, or other property within the various national parks and monuments, and moneys which may be donated for the purposes of the national park and monument system.

This authority is similar to that granted in the case of Glacier National Park last year. I am sure no additional burdens would be placed upon the Federal Government through the exercise of this authority. It would not extend to the acquisition of new parks. If lands valuable for national-park purposes—such as the sand dunes of Indiana, for instance—should be offered to the Federal Government, the gift would be brought to the special attention of Congress and special authority for accepting the same would be urged. In the same way should an opportunity to secure a particularly valuable piece of property lying outside of an existing park be afforded, we can go to Congress for special legislation covering its acceptance.

IMPORTANT GIFTS OF PROPERTY.

The following are the more important gifts of property that have been accepted by us for national-park purposes:

1. A gift of the old Tioga Road in Yosemite Park in 1915, at a cost of approximately $15,000. The sundry civil act of March 3, 1915,[1] was our authority for the acceptance of this gift:

> The Secretary of the Interior is authorized to accept patented lands or rights of way, whether over patented or other lands in the Yosemite National Park, that may be donated for park purposes.

2. A gift of part of the Giant Forest by the National Geographic Society in 1916, at a cost of $20,000. Authority for the acceptance of this gift was granted in the sundry civil act of July 1, 1916:[2]

> The Secretary of the Interior is authorized to accept patented lands or rights of way, whether over patented or other lands in the Sequoia National Park, that may be donated for park purposes.

3. A gift of the administration site across the river from Belton Station, Glacier National Park, was made in 1917. One hundred and sixty acres were included in this gift and it cost approximately $8,000. Authority for the acceptance of this gift was granted in the sundry civil act of July 1, 1916:[2]

> The Secretary of the Interior is authorized to accept patented lands or rights of way over patented lands in Glacier National Park that may be donated for park purposes.

4. A gift of a tract of land for a warehouse and garage at Glacier Park Station, Glacier National Park, was made in 1917. Authority for the acceptance of this gift was granted in the sundry civil act of June 12, 1917:[3]

> The Secretary of the Interior is authorized, in his discretion, to accept buildings, moneys, or other property which may be useful in the betterment of the administration and affairs of the Glacier National Park, under his supervision, and which may be donated for park purposes.

5. A gift of a tract of land at Glacier Park Station for fish hatchery purposes was made in 1918. Authority for the acceptance of this gift is the same as in 4.

6. A gift of a road in Rocky Mountain National Park leading to the free public camp ground in Glacier Basin, which has just been completed and accepted by the Government. Authority for the acceptance of this gift was granted in the sundry civil act of June 12, 1917:[4]

> Hereafter the Secretary of the Interior is authorized to accept patented lands or rights of way over patented lands in the Rocky Mountain National Park that may be donated for park purposes.

There are two striking instances of entire national monuments coming into public possession by gift. One of these is the famous Muir Woods, near San Francisco, the gift of former Representative William Kent. The other is the Sieur de Monts National Monument, on Mount Desert Island, Me., the gift of a group of public-spirited summer residents of the neighborhood. The Pacific reservation contains one of the finest stands of California redwood still in existence. The Atlantic reservation incloses a group of mountains which are famous in history and in the scenery of the East.

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[1] 38 Stat., 822, 863. [2] 39 Stat., 262, 308. [3] 40 Stat., 105, 151. [4] 40 Stat., 105, 152.

A WONDERFUL EXAMPLE OF GIVING.

In studying the question of supplementing congressional appropriations wherever possible by the acceptance of property donated by individuals and State governments I have had occasion to analyze the details of the magnificent development of the Palisades Interstate Park in New York and New Jersey, which has been carried on largely through cooperation between private individuals and State activities.

After endeavoring in vain to get the Federal Government to preserve the Palisades of the Hudson, the States of New York and New Jersey, about 1900, created the Palisades Interstate Park Commission and appropriated $15,000 to begin the work of surveying and investigating titles of tracts of land along the Hudson. Most of the money, however, was used to bind an option on a big quarry, which was finally purchased for $132,500, $122,500 being donated by citizens of New York.

After the surveys were completed it was found that approximately 900 acres of land would have to be purchased in order to preserve the palisades, and this land was procured by the States of New York and New Jersey for approximately $500,000. In 1910 New York State appropriated $2,500,000 and added the Bear Mountain Prison site of 500 acres to the Palisades Park. Mrs. E. H. Harriman then donated 10,000 acres of land and $1,000,000. Other parties in turn donated a total of $1,600,000.

In 1916 New York State appropriated $2,500,000 more for the further enlargement of this great park, and a like amount is being subscribed from private sources. Up to the early part of last year there were 30,000 acres of land in the park and nearly $8,000,000 had been expended in its acquisition and improvement. Of this amount, 55 per cent was donated to the Palisades Interstate Park Commission and 45 per cent appropriated by the State legislatures.

I believe that if the requisite authority should be granted to the Park Service to pursue the lines of development adopted by the Palisades Commission we will be able to secure in the next few years a great amount of outside assistance in national-park development, both from States and individuals.

GROWTH OF THE NATIONAL-PARK SYSTEM.

When the National Park Service was organized we had 17 national parks and 21 national monuments. We now have 16 national parks and 24 national monuments. The explanation is that one of the national parks of 1916, the Casa Grande Ruin, has been withdrawn from that classification and made a national monument, and two other national monuments have been created. The total area of national parks is now 6,254,465.45 acres, or 9,773 square miles. The total area of the national monuments is 1,241,265.04 acres, or 1,939 square miles. All these reservations, except the Sieur de Monts National Monument in Maine, lie west of the Mississippi River. One national park is in Alaska and one in Hawaii.

The first national reservation, Hot Springs, was created in 1832. The name national park had not yet been invented, and it was 50 years before Hot Springs was regarded as a park—not, in fact, until the Yellowstone National Park had become famous under that title. The Yellowstone was made a national park in 1872 and for a long time was popularly known as "the national park" in ignorance of the fact that Hot Springs had enjoyed the same legal status for many years.

Meantime the Casa Grande Ruin had been reserved and became loosely classed with Hot Springs and Yellowstone as a national park, notwithstanding that it possessed none of the accepted qualities of parkhood. This was long before the days of the national monuments. And so it has remained until recently, when it was recognized as essentially a national monument, and so proclaimed by President Wilson. It is really, then, the first national monument, although the Devils Tower was the first to be officially so designated.

CREATION OF THE KATMAI NATIONAL MONUMENT.[1]

While the last year has showed no additions to the number of the national parks, the system has been enlarged and enriched by the addition of an interesting and important monument of large area in Alaska. President Wilson created the Katmai National Monument by proclamation of September 24, 1918.

This new monument will have wide popular interest. It is situated on the southern shore of Alaska about midway of a volcanic belt which has shown extraordinary activity during recent years. The eruption of Mount Katmai in June, 1912, was one of excessive violence, ranking in the first order of volcanic explosions. While volcanoes in Japan and Italy have expelled a greater cubic content of material, the fact that Katmai's initial eruption lasted three days sets it in a class by itself.

The crater left by this explosion is large. Its circumference measured along the highest point of the rim is 8.4 miles. The area is 4.6 square miles. "The precipitous abyss," writes Robert F. Griggs, who explored it for the National Geographic Society, "is somewhat shorter, measuring 2.6 miles in length, 7.6 miles in circumference and 4.2 square miles in area. The milky blue lake in the bottom is 1.4 miles long and nine-tenths of a mile wide, with an area of 1.1 square miles. The little crescent-shaped island in the lake measures 400 feet from point to point. The precipice from the lake to the highest point of the rim is 3,700 feet."

For comparison among volcanoes classed as active Mr. Griggs cites the crater of Kilauea in the Hawaii National Park, whose greatest diameter is 2.93 miles, whose circumference is 7.85 miles, and whose area is 4.25 square miles. Katmai's crater is slightly larger, but is exceeded by that of Haleakala, also in the Hawaii National Park, which is 7½ miles long and 2½ miles wide, with a circumference of 20 miles. Haleakala, though it has not erupted for nearly 200 years, is classed as active by the Hawaiian Volcanic Observatory. It will be recalled that Lassen Peak's long series of eruptions in 1914 and 1915 followed a quiescence of more than 200 years.

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[1] See following issues of the National Geographic Magazine: Vol. XXIV, No. 2, February, 1913, "The Recent Eruption of Katmai Volcano in Alaska," by George C. Martin, of the U. S. Geological Survey; Vol. XXXI, No. 1, January, 1917, "The Valley of Ten Thousand Smokes," by Robert F. Griggs; Vol. XXXIII, No. 2, February, 1918, same title and author.

Of craters no longer active, only four exceed Katmai's in size. Aso-san, the monster crater of Japan, is 14 miles long by 10 miles wide; Lago di Bolsena, in Italy is 8½ miles long and 7½ miles wide; Monte Albano, also in Italy, is 8 miles long and 7 miles wide; and Mount Mazama, in which lies Crater Lake, our National Park in Oregon, is, to quote Mr. Griggs's figures, 6 miles long by 4 miles wide.

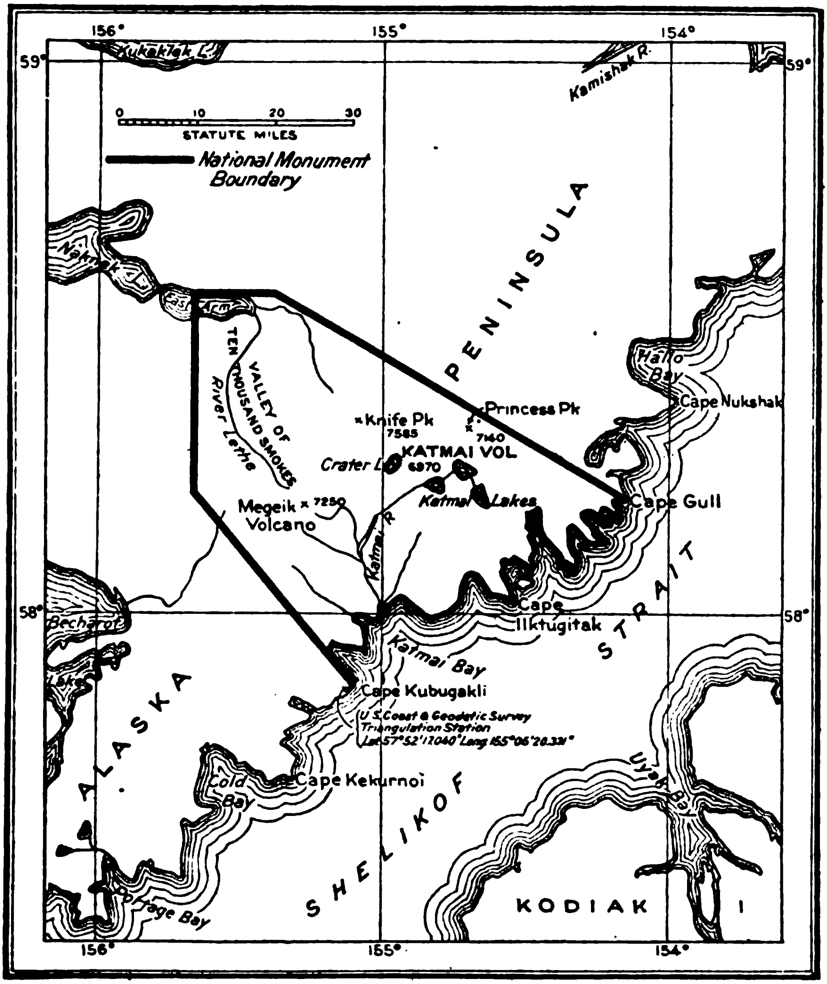

FIG. 1.—Map showing boundaries of Katmai National Monument, Alaska.

"THE VALLEY OF TEN THOUSAND SMOKES."

A fascinating feature of the Katmai National Monument, one that Mr. Griggs describes as "one of the greatest wonders of the world, if not indeed the greatest of all the wonders on the face of the earth," was named by him the "Valley of Ten Thousand Smokes." It lies a few miles west of the volcano just over Katmai Pass at the head of the Naknek Lake watershed. First discovered in

1916, it was explored in June, 1917, by the National Geographic Society's fourth expedition to this region. Imagine a valley several miles in length from whose bottom, and from those of its tributary valleys, emerge many thousands—millions, Mr. Griggs believes—of jets of steam. Some of these jets rise a thousand feet. Hundreds or thousands rise 500 feet. All merge into one titanic cloud.

The exploring party had many thrilling adventures. They cooked their meals anywhere they happened to be over the nearest vent. Their steam-heated tent was much too warm for comfort; a thermometer thrust 6 inches into the dirt floor promptly rose to boiling point. The end of a stick thrust into some of these vents was quickly charred.

The region offered, indeed, an astounding spectacle. The escaping steam (for it is steam, not smoke, that creates the spectacle) was in places strongly impregnated with sulphurous vapors. The ground was in places far too hot to walk upon.

This amazing valley is an example of what the geyser basins of Yellowstone were at the close of the eruptive period of Yellowstone's once great volcanoes. There, as will happen here, geysers did not form until surface temperatures for perhaps thousands of feet of depth declined far below the boiling point. Bunsen's theory of geyser action, which is now generally accepted by science, presupposes a column of spring or surface water filling the geyser vent above the steam which is making in some deep recess of the rocks. With a near-surface temperature above boiling point, as in the "Valley of Ten Thousand Smokes," such a column of water can not exist; it will promptly turn to steam and dissipate.

In course of time, many centuries perhaps, the surface here will cool sufficiently for the vents to retain water. Then geysers form as in the Yellowstone. The addition to our national-park exhibits of this remarkable region thus becomes peculiarly valuable, because it shows, in connection with Yellowstone, the formative as well as the completed phases of geyser action. It is also pleasant to think that, after the inevitable decline of the Yellowstone geyser field many centuries hence, the American national-park system will be coming into possession of possibly even a greater geyser exhibit than now.

The American public owes deep gratitude to the National Geographic Society for the discovery and exploration of this unique exhibit. Four expeditions were sent to the region before the facts and the records were complete.

TO MAKE THE GRAND CANYON A NATIONAL PARK.

In the first year of the world war it was not to be expected that an overworked Congress should devote the time necessary for the careful consideration of new national-park projects. It is unfortunate, however, that so meritorious a proposition as the promotion to parkhood of so world-famous an area as the Grand Canyon of Arizona should have failed to reach a final vote; the bill, however, passed the Senate on May 16, 1918[1].

To people of other lands, to whom the Grand Canyon has been known for many years as the greatest scenic wonder in the world.

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[1] See p. 1039 for report on S. 390, "A bill to create the Grand Canyon National Park."

our failure to make it a national park after so many years of appeal to Congress is a matter of astonishment. In many of the foreign estimates of the great natural spectacles of America the Grand Canyon stands at the top. Its absence from the list of our national parks, therefore, seems to belittle, in foreign eyes, our entire national-park system. What can the system amount to, they ask, if it doesn't even include the Grand Canyon? It is useful at times to get the perspective of foreign opinion in order to correct the stigmatism of our own too close view of ourselves and our affairs.

It must be remembered that it has been very few years indeed since the country and Congress began to awaken to the full importance of our national-park system. The Grand Canyon proposition has been sidetracked many times, not through failure to appreciate the importance of the Grand Canyon, but through failure to appreciate the national parks. Now, since Congress has taken an active interest in this project, Arizona's own attitude, until recently influenced on this subject by private and corporate interests, has interfered. In the past year, however, when it became a real State issue, the Arizona Legislature passed unanimously a resolution in favor of making the Grand Canyon a national park.

There now exists, therefore, no reason why this long-delayed and important act of patriotism and justice should not be performed, and it is to be hoped that in the coming session the House will devote the few minutes necessary to confirm the expressed judgment of the Senate on this question.

The House Committee on the Public Lands reported the bill favorably on October 18, 1918.

THE MAMMOTH CAVE A PROMINENT CANDIDATE.

Besides these national-park projects there are others that should have consideration. It seems particularly important that steps should be taken to secure "distinguished examples of typical forms of world architecture" and other areas of distinctly national value that are to be found in the Eastern States. Prominent among these are the Mammoth Cave, in Kentucky, and the Sand Dunes area, in Indiana, that borders the southern shore of Lake Michigan.[1]

Efforts have been made in the past to secure the Mammoth Cave region for the Nation, but for various reasons the project has failed. At one time it was proposed that the Federal Government buy the property outright. A bill was introduced and hearings were held on the measure, the proceedings of which have been printed.[2]

This world-famous cavern is situated in a forest of virgin growth at the head of navigation of the Green River, Ky. It is not many miles from the center of population of the United States. Nature has made it one of the most magnificent of limestone caves. Its chambers and passages, which, so far as explored, aggregate nearly 40 miles, are gorgeously decorated.

Much can be said in favor of acquiring this great scenic property for a national park. The Green River at this point is deep, broad, and quiet, remarkable for its majestic scenery. The country is typical of the noblest of eastern landscape. Few deciduous forests exist equal to the thousands of surrounding acres. Its accessibility to great populations will constitute a strong argument in its favor.

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[1] See report on proposed San Dunes National Park, Indiana, published by the National Park Service.

[2] Hearing on H. R. 1666, Establishing the Mammoth Cave National Park. Hearing held May 3, 1912, before the Committee on Military Affairs, House of Representatives, Sixty-second session.

The discovery of the great Onyx Cave two years ago, has stimulated new interest in this remarkable cavern district of Kentucky. This magnificent cave is not far from Mammoth Cave and should, if possible, be included in a national-park project. The placing of this whole district among the national parks would make possible a development along the lines of the big parks of the West. Camping, boating, and motoring would be the principal recreational advantages of a national park here, while the wonderful formations of the caves would furnish the supreme thrills of delight.

THE SAND DUNES OF INDIANA.

The recreational advantages of the Sand Dunes area of Indiana are too well known to require further comment in a report of this character. Located near the center of population of the United States, and within easy motoring distance of Chicago, as well as accessible from several railroad lines, this region, or a substantial portion thereof, is well worthy of parkhood.

These Indiana sand dunes typify one of nature's most interesting constructive forces. The fact that they are uniquely rich in plant life, and, during part of the year, the habitat of a large variety of birds also entitles them to national preservation for future generations.

TO PRESERVE THE COAST REDWOODS.

A strong movement is under way to secure one of the few remaining great stands of California redwood (sequoia sempervirens) as a public exhibit for all times. This famous tree is nearing its extinction; the only examples safe for posterity are the Muir Woods, in Marin County, a small State forest in Santa Cruz County, Cal., and the 800 acres acquired by the Bohemian Club of San Francisco for its annual revels. None of these exhibits the redwood in the glory of its fullest development and greatest sweep of forest. The movement noted has for its object the acquisition of such a forest while there still is opportunity. A stand of great magnificence has also been located in northern California. A strong committee is forming to raise money from private sources, if necessary, to put the project through. At this writing the organization is nearly completed under the title "Save the Redwoods League."

OTHER PARKS SUGGESTED.

Legislation which has for its purpose the establishment of the Lafayette National Park embracing the area now reserved as the Sieur de Monts National Monument is pending in Congress. I earnestly trust that it will receive favorable consideration in the present Congress. Other measures designed to accomplish this same purpose, but giving the proposed park the name of Mount Desert National Park are also pending, one bill having already passed the Senate. This park proposition is discussed in another part of the report.[1]

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[1] See p. 888; also see reports on S. 4569 and S. 4957, pp. 1041-1044.

Two other projects now before Congress which are receiving the earnest attention of this bureau contemplate the establishment of the Denver National Park to include the Rocky Mountain region in the vicinity of Mount Evans directly west of the city of Denver; and the Cliff Cities National Park, to include the remarkable Frijoles Canyon, Pajarito Plateau, and other lands in or near the present Bandelier National Monument in New Mexico, a region rich in relics of a prehistoric race and apparently the logical companion park for the Mesa Verde with its wonderful cliff dwellings and other works of vanished people. Both of these projects are under investigation at the present time, and when thoroughly studied from the national park point of view detailed reports will be submitted for the information of congressional committees.

SUGGESTED FOR NATIONAL MONUMENTS.

Several propositions to establish new national monuments are pending at the present time. One has for its object the preservation of the remarkable prehistoric towers of the Hovenweep region on both sides of the boundary line of Utah and Colorado and not far from the Mesa Verde National Park. These towers were examined a year ago by Dr. J. Walter Fewkes, Chief of the Bureau of Ethnology, and by him reported to be among the most interesting and valuable relics of ancient civilization now accessible in the Southwest. They are not far distant from the Dolores, Colo.,-Bluff, Utah, road. When protected and opened to the public these towers will be the object of an exceedingly worth-while side trip from Mesa Verde Park.[1]

Another project contemplates the permanent reservation and development of Scotts Bluff, Nebraska, that imposing old landmark on the North Platte that guided many parties of pioneers in their westward journey across the plains. It has had a place in the history of the West since the days of the " free trappers "; but is best known to those who have read the fascinating stories of the old Oregon Trail.

A third project under consideration suggests a means of saving some of the palms of the species *Washingtonia filamentosa* which are so near extinction in this country at the present time. Several hundred of these palm trees are growing in a somewhat remote section of southern California. These are in several rather widely separated groves, but it seems feasible to arrange for the preservation of one or two of them, at least. They can be reached from Palm Springs. A fine grove of these palms until recently was accessible by a short trip from Indio, Cal., on the Southern Pacific. Its destruction was a real loss to the science of botany.

The Federal Government has never engaged in the purchase of land for park purposes, except in the case of the acquisition of patented lands in existing national parks, when such lands are necessary in the administration and protection of the adjacent or surrounding Federal areas. It is a question whether after the war Congress will adopt a broader policy of appropriating public funds from the National Treasury for the purpose of rounding out and completing the national park system. In all likelihood new areas may have to be acquired in large part by the States or by private subscriptions, tendered to the Federal Government for acceptance and development.

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[1] See Plate XV, page 878, for a photograph of some of the towers.

THE ONE SYSTEM SHOULD INCLUDE ALL.

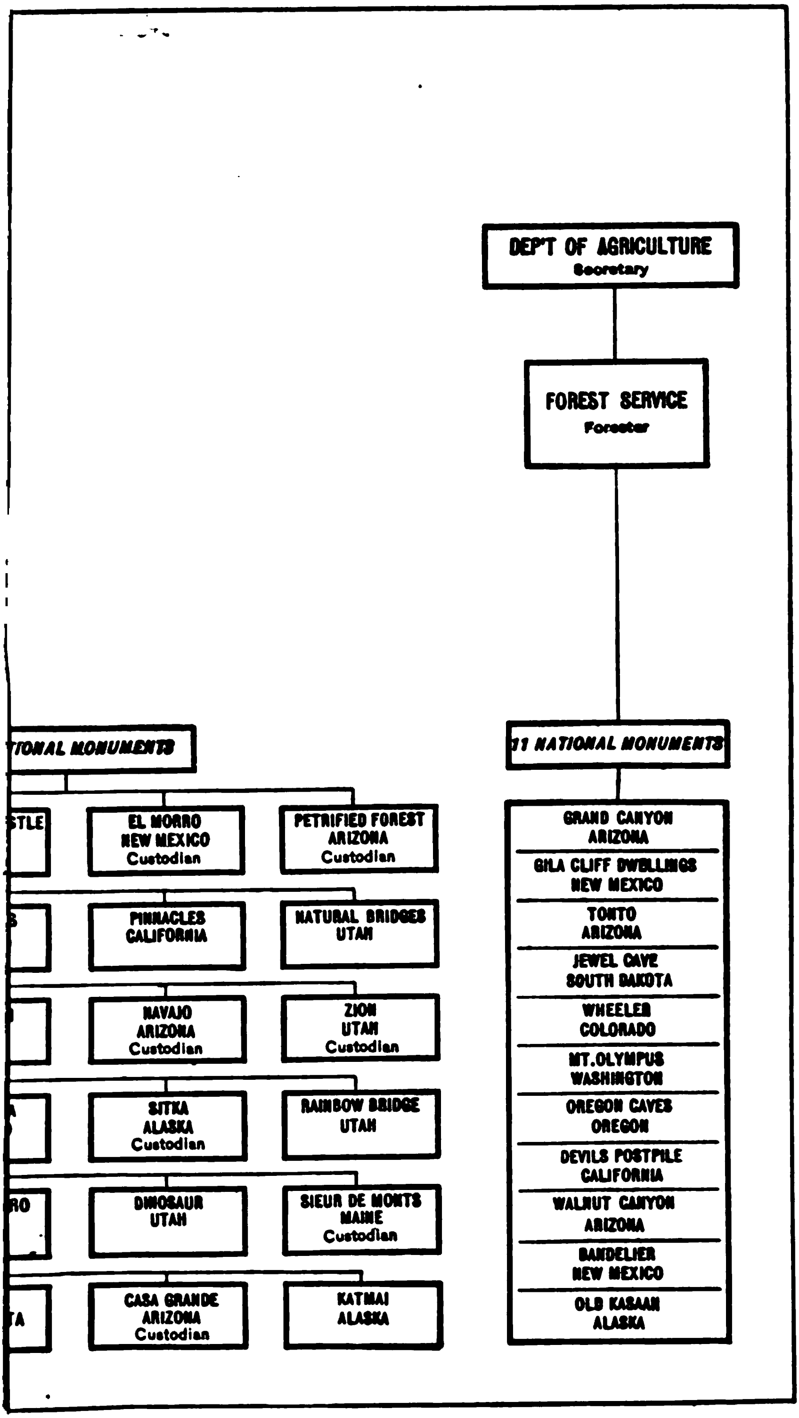
In last year's report attention was called to the fact that all of the national park areas of the country are not under the jurisdiction of the National Park Service, and the suggestion was advanced that the time was at hand when the national park system should be consolidated under one head. Our organization now lacks control of 11 national monuments administered by the Department of Agriculture because they are within the confines of national forests, 2 national monuments within military reservations, 5 national military parks set apart for the purpose of safeguarding famous American battlefields, and 2 other reservations including Lincoln's birthplace which are administered by the War Department. An examination of the diagram herein will show at a glance the complete detachment of these potential parts of the national park system. In the interests of efficiency this fault should be remedied. With very little expansion of this Service all of these park areas, and others likely to be established in the early future, can be effectively cared for.

From the standpoint of travel to the national parks the advisability of immediately putting all of the national monuments under the control of this organization can not be seriously questioned. Many of the national monuments are beginning to loom importantly as scenic meccas, and this tendency is growing rapidly. Increasing numbers of visitors to national parks desire to extend their observations to national monuments in the neighboring national forests. It is exceedingly difficult to explain why some of these great national wonders are under the control of the Department of Agriculture, while others of exactly the same type of reservation are within the jurisdiction of this department. The same is also true in the case of park areas under the War Department. All should be placed under the general jurisdiction of the National Park Service to the end that harmony and effectiveness may characterize the administration of the nation's park areas. The consolidation of all of these Federal reservations, as I have recommended, should be considered during the period of the war in order that plans for the future may be developed comprehensively while new improvement work and other activities are suspended or reduced in accordance with war requirements.

OUR EXAMPLE SPREADING ABROAD.

In last year's report mention was made of official action in several foreign countries looking toward the establishment of national parks or reservations similar in character to our parks and national monuments. The Government agencies and enterprises interested in these projects have made considerable progress toward the consummation of their plans during the past year. This is especially true as regards the movements to safeguard scenic areas in Italy and Spain.

In the former country the Parco Nazionale dell'Abruzzo, planned and supported by the Commissione per i Parchi Nazionali della Fed-


DEP'T OF AGRICULTURE
Secretary
FOREST SERVICE
Forester
11 NATIONAL MONUMENTS
GRAND CANYON ARIZONA
GILA CLIFF DWELLINGS NEW MEXICO
TONTO ARIZONA
JEWEL CAVE SOUTH DAKOTA
WHEELER COLORADO
MT.OLYMPUS WASHINGTON
OREGON CAVES OREGON
DEVILS POSTPILE CALIFORNIA
WALNUT CANYON ARIZONA
BANDELIER NEW MEXICO
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EL MORRO NEW MEXICO Custodian
PETRIFIED FOREST ARIZONA Custodian
PINNACLES CALIFORNIA
NATURAL BRIDGES UTAH
NAVAJO ARIZONA Custodian
ZION UTAH Custodian
SITKA ALASKA Custodian
RAINBOW BRIDGE UTAH
RO
DINOSAUR UTAH
SIEUR DE MONTS MAINE Custodian
TA
CASA GRANDE ARIZONA Custodian
KATMAI ALASKA

erazione "Pro Montibus," is likely to be established soon. This park project embraces a wonderful scenic area in the Appennines almost due east of Rome. When dedicated for park purposes it will also become an exceedingly valuable game preserve. Many species of animal life now inhabit the region and with proper protection will rapidly increase. The Federazione pro Montibus has issued two very attractive publications on this park project, both of which are illustrated. They describe, in considerable detail the nature of the park area, the extent of its forest growth, its animal life, and other important feature.[1]

It is reported also that the Italian Government has under consideration the establishment of a national monument to include the famous Monte Grappa which has been the scene of so much bitter fighting during the past year.

In Spain, according to press reports, a law has been passed under which national parks may be established. The State is given authority to choose members of the park system which are to include distinctive natural features of Spain—the most beautiful scenic areas, forests, and lakes. Special attention is to be given to the preservation of the flora and fauna of these reserved areas. King Alfonso has taken a personal interest in this work and was the first to suggest a national park in the Sierra de Gredos. The King observed that the fauna of the region were rapidly disappearing and urged that the park be created for the primary purpose of preserving the wild life. It is reported that he personally assumed the expense of safeguarding this area until other arrangements were made to undertake this work.

It is gratifying to note that, in promoting their national park projects foreign countries have made special mention of the national park system of the United States; the policies of this Government in safeguarding its great scenic areas have undoubtedly guided to some extent the planning and development of the park projects abroad. The illustrated articles on our national parks which have appeared during the past two years in the Pan American Bulletin, and particularly those printed in its Spanish, French, and Portuguese editions, have, in my opinion, accomplished as much in telling the world in general about the American national park system as any other agency.

THE YEAR IN THE PARKS.

As the following summary of the activities of the National Park Service during the past year will indicate, we are keeping the national parks open and available to the enjoyment of those who care to visit them, protecting them from injury and maintaining their improvements to the extent possible under existing conditions, while planning for their larger improvement and use after the war is over. These statements are necessarily brief. The reports of the superintendents of the national parks and the custodians of the larger monuments, found in Appendix B, contain detailed information regarding the accomplishments of the year in the field. All of these reports have been prepared with special care and are in a high degree interesting and valuable to all who are interested in the administration, protection, and improvement of America's playgrounds.

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[1] Il parco nazionale dell'Abruzzo. per Luigi Parpagliolo, della Direzione generale della Belle Arti, Dalla Nuova Antologia, 16 Maggio, 1918. Roma, Direzione Della Nuova Antologia, Piazza di Spagna (S. Sebastiano, 3).

Il Parco Nazionale dell'Abruzzo, Roma, Federazione Italiana Delle Associazioni Pro Montibus ed Enti Affini, 1917.

YELLOWSTONE NATIONAL PARK.

Just as the year 1917, with its reorganized concession system, stands a distinguished landmark in the administrative history of the Yellowstone National Park, so the past year looms large in the history of its protection and improvement. In fact, in point of protection, it ranks in importance with 1894 when the act was passed to provide for the punishment of violations of the rules and regulations.

SOLDIERS REMOVED FROM THE PARK.

By authority of the sundry civil act of July 1, 1918, the National Park Service was placed in complete control of the administration, protection, and improvement of the park, thus relieving the troops from further duty in connection with patrolling the reservation, and withdrawing the road construction and maintenance work from the control of the Engineer Corps of the Army. In other words, Yellowstone National Park was accorded exactly the same type of government and management that all of the other national parks under the jurisdiction of this department, except one, Crater Lake, enjoy.

In 1916, acting under authority reposing in your office, you authorized the removal of the military detail from Yellowstone Park, and the establishment of a civilian ranger force to take its place. On October 1, 1916, by arrangement with the War Department, and with its hearty cooperation, Fort Yellowstone was taken over by this department, and the troops on duty there were sent to a station on the Mexican border. A new ranger force was organized, composed partly of scouts long connected with the administration of the park, and partly of certain soldiers who, because of their special qualifications and intense interest in the development of the park, were discharged from the Army to join this service. Throughout the winter of 1916–17, one of the severest on record, and until it became necessary to disband because of adverse legislation, this force gave the wild life of the park a measure of protection which, up to that time. was scarcely considered humanly possible.

Meantime Congress, on the facts then before it, reached the conclusion that Fort Yellowstone ought not to have been abandoned by the War Department, and that it could be better protected by soldiers than by rangers; and thereupon, by making Interior Department funds nonavailable for protective purposes through legislation in the sundry civil bill of June 12, 1917, made necessary the recall of the Cavalry to the park. The ranger force was disbanded on June 30, 1917, and Fort Yellowstone was regarrisoned.

During the next half year, the National Park Service, aided by officers of the Army, gathered additional data relating to the inadvisability of using troops in the protection of national parks, devoting considerable attention to the cost of maintaining a military force in this isolated post where there was no opportunity for troop drill or other army work. These facts and figures were placed before the Appropriations Committee in the spring of this year, together with the data formerly available, and the result was favorable action upon our recommendation that the troops should again be removed from the park.

AN EFFECTIVE RANGER SYSTEM.

A new ranger force, composed largely of members of the force developed in 1916 and disbanded last year, was organized during the summer just past, and is now engaged in protecting the park. Each one of these men has released four or five soldiers for war service without, in the slightest degree, reducing the patrolled area of the park. The military force necessarily had to maintain a semblance of army organization in the park, hence its outposts were garrisoned with squads of men, only one or two of whom regularly patrolled each district. Under the new organization, rangers are assigned in pairs to districts and each is required to do patrolling work. Thus the cost of protecting the park has been reduced enormously.

The rangers are all hardy men of the mountains, skilled in forestry and woodcraft, accustomed to the hardships of the severe winters, trained in the use of snowshoes and skiis, and thoroughly familiar, in most cases, with the entire park area. The soldiers formerly controlling the park were never sent there for a long tour of duty, and, consequently, never became thoroughly acquainted with the park or intensely interested in the performance of their duties. That the park will receive better protection under the new order of things can not be questioned. In fact, the superiority of civilian ranger forces over troops as park guards has been conclusively demonstrated in the cases of Yosemite, Sequoia, and General Grant National Parks, from which the military forces were withdrawn in 1913.

The permanent ranger force will consist of 1 chief ranger, 4 assistant chief rangers, and 25 rangers of the first class. During the tourist season and during the period of greatest danger on account of fire this force will be supplemented by 25 temporary rangers, traffic officers, and automobile checkers.

ECONOMY AND EFFICIENCY OF THE NEW ORGANIZATION.

Not less important than the organization of the new ranger force is the assumption by the National Park Service of control over the work of maintaining and improving Yellowstone National Park. For many years this work had been performed under the direction of the Chief of Engineers of the Army, who was represented in the park by one, and sometimes two, officers of the Engineer Corps. All maintenance, improvement, and construction work was performed in the park without the advice and direction of the Interior Department. The worst features of this divided administration were the entire lack of a comprehensive policy which considered the popular uses of the park and, in late years, the failure to give any degree of permanency to the organization of the engineering force. Engineer officers were detailed to the park for short periods of time, then replaced by others, who often came with different ideas from their predecessors; there was constant altering, modifying, and changing of plans for improvement work and of methods of performing this work.

Then, as the engineer officers were not under the control of the commanding officer in charge of the protection of the park, the reservation had three heads wholly independent of each other—the superintendent of the park, who since 1916 has reported directly to the National Park Service and who has had charge of the administration of the park and the control of concessions, care of wild animals, etc.; the Army officer in command of the troops in charge of the protection of the park, who reported to the commander of the Western Military Department at San Francisco; and the district engineer officer in charge of improvements, who reported to the Chief of Engineers of the Army. It was necessary to maintain three distinct offices, three separate office forces, and separate warehouses for equipment and supplies. In many other respects also there was a duplication and triplication of effort. Under the new organization, in which the administration, protection, and improvement of the park is combined under the direction of this Service, large economies can be effected in several directions. The offices have been combined and the attractive stone structure formerly occupied by the engineers, not far distant from the Mammoth Hotel, has been made the headquarters of the park. Here all of the business relating to the park is and will continue to be transacted.

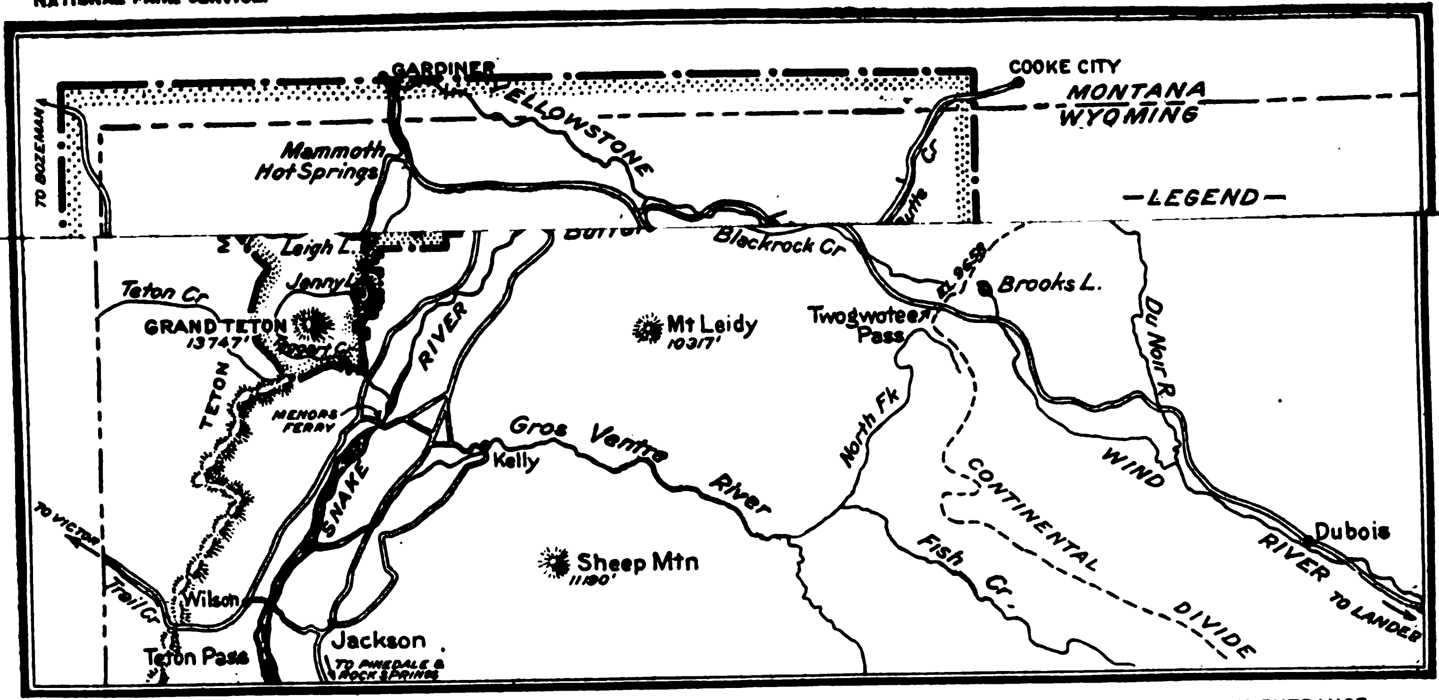
THE TETONS SHOULD BE ADDED AT ONCE.

The machinery for developing this great playground on a broad scale is complete. The next thing to accomplish there is the enlargement of the park to the extent necessary to carry out our plans for its comprehensive improvement. Part of the Jackson Hole region and the headwaters of the Yellowstone River, south and southwest of the park, should be added to it immediately. This extension would include the wonderful serrated peaks of the Teton range, Jackson Lake, all of the rugged scenic lands north of the Buffalo Fork of the Snake River, including the valleys of Pilgrim and Pacific Creeks to Two Ocean Pass; also the canyons, lakes, and forests of the Upper Yellowstone and the Thorofare Basin. Every foot of this area naturally belongs to Yellowstone Park. The map herein will clearly indicate to the reader the fact that the new boundaries proposed are natural lines, except where the Idaho-Wyoming boundary line is used near the southwestern corner of the park.

The addition of this territory will give Yellowstone a stupendous exhibit of a kind of scenery that she lacks at the present time; it will make possible the development of Jackson Lake and the upper Yellowstone as great tourists' resorts; it will make feasible the construction of a road up Pacific Creek over Two Ocean Pass, down Atlantic Creek to the Yellowstone River, thence along the river and the east shore of Yellowstone Lake to a junction with the scenic Cody Road; it will afford permanent protection to all of the summer range and much of the winter range of the southern elk herd, and will give ample opportunity for the moose of the Fall River district to thrive under proper conditions for their protection.

THE "GREATER YELLOWSTONE" BILL.

The bill providing for this extension, H. R. 11661, by Mr. Mondell, is now pending in the House of Representatives and its early passage



MAP SHOWING PROPOSED ENLARGEMENT OF YELLOWSTONE NATIONAL PARK AND DEVELOPMENT OF SOUTHERN ENTRANCE.

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can not be too strongly urged. The President has withdrawn all of the lands embraced within the proposed new boundaries in aid of this legislation. No homesteads or other private interests can be acquired while this measure is pending.

The pending legislation not only provides that all rights of the settlers in this proposed area are to be fully protected, but it also authorizes the use of park lands for the grazing of such live stock as they are able to maintain in winter through the development of their farms. It is only just and proper that this use should be permitted and it can by no possibility interfere with the enjoyment of the enlarged park because the Secretary of the Interior has full power to designate what grazing lands shall be used. This provision, of course, does not extend to the use of lands within the original boundaries of the park for the grazing of domestic stock. No settlers in this area are engaged in the raising of sheep. At the present time there are 1,910 acres of patented lands, and 3,114 acres embraced in pending entries in the total area of 844,800 acres.

This project was presented to Congress several times many years ago, but did not receive favorable consideration. In the case of several measures proposing to add land lying south and east of the park, the proposal to eliminate from the park all territory lying north of the Yellowstone and Lamar Rivers in order that a railroad might be built in this region was involved. On other occasions it is probable that the project failed either because certain mining properties east of the park were included or because of other features involving private interests to a considerable extent.[1] All of the lands embraced in the present project now lie within a game preserve. There are exceedingly few private interests involved and the legislation now pending provides for their complete protection and for the future development of their properties. No other interests can reasonably be involved except those of the National Government. The land belongs to the United States, all but the few acres of private holdings, and should forever remain the Nation's possession for the pleasure and benefit of all of the people.

EMERGENCY MEASURES FOR A WAR SEASON.

From the standpoint of travel the Yellowstone National Park fared rather worse during the 1918 season than any other large western park. It is situated at a very great distance from large cities and is always dependent to a considerable extent on the railroads to bring visitors to its gates. The withdrawal of railroad advertising and the discouragement of travel by rail indicated early in the year that the number of visitors to the park during the summer season would not approach that of any one of the past three seasons.

As a measure of protection to park concessions, especially the hotels and camps, which involve very large investments, authority was granted in April for the closing of the hotel and the permanent camp at Yellowstone Lake, thus making it necessary for all tourists to spend a longer period of time than usual at the Canyon.

Subsequent study of the situation resulted in our going still farther. With labor extremely hard to get and a growing certainty of light travel, a heavy loss faced both hotel and park systems if both were to be operated in competition. To accommodate the greater number at lower charges, we therefore decided to close the hotels and turn all the season's business into the permanent camps. For the further protection of these camps authority was also granted to their management for the closing of the establishments at Riverside, near the western gateway, and at Tower Falls. This left the big camps at Upper Geyser Basin, the Grand Canyon of the Yellowstone, and Mammoth Hot Springs to take care of the season, which they were amply able to do. The automobile lines of the Yellowstone Park Transportation Co. connected daily with trains at Yellowstone and Gardiner, Mont., and Cody, Wyo. Excursion tickets to the park covering trips into the reservation by one gateway and out by another gateway were sold by the authority of the United States Railroad Administration. Train service to the park was generally good although the decrease in travel required a reduction of Pullman facilities, which made necessary certain layovers which often proved inconvenient to those using other than direct transcontinental lines. The falling off in train travel was considerable. Only 3,026 persons entered the park by rail as against 13,350 persons in 1917. The decrease in automobile travel was relatively small, 4,734 cars carrying 17,317 people having entered the park in 1918 as against 5,703 cars carrying 21,268 people in 1917.

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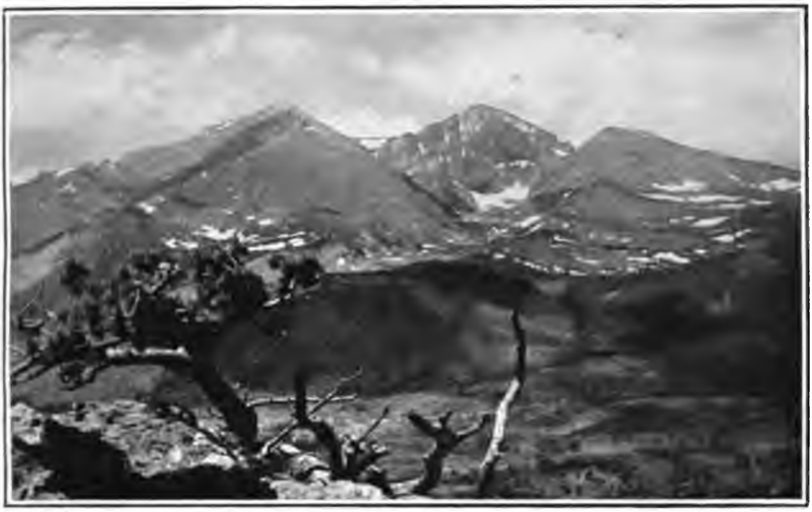
[1] See S. Doc. No. 39, 55th Cong., 3d sess., and H. R. Doc. No. 500, 57th Cong., 1st sess.

SPRING FRESHETS DAMAGE THE ROADS.

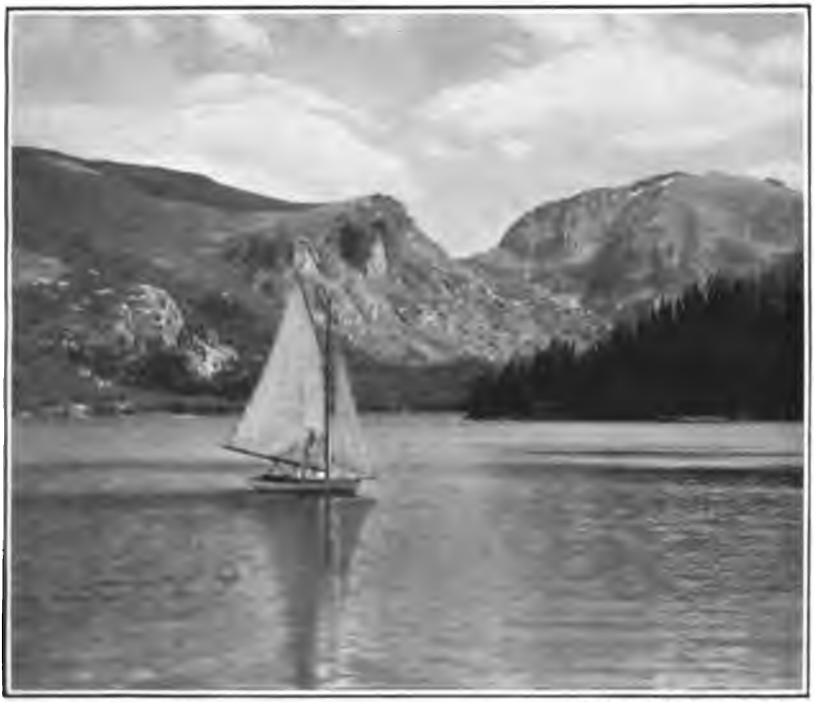
Despite the fact that flood waters resulting from the sudden melting of snow in the late spring caused enormous damage to the north and east roads to the park and to some of the roads within the park itself, these were quickly made passable for visiting motorists. An additional appropriation of $25,000 was made to meet this emergency, and, in the course of the summer, that part of the eastern approach from Cody which lies within park boundaries was practically restored to its normal condition. In fact these repairs will, when fully completed, put this highway in better shape, with better protection from high water than it ever had before. As for that part of the road lying outside the park boundaries, repairs were wholly the work of public-spirited citizens of Cody. These men closed the doors of their business houses and, taking tools and supplies in their automobiles, proceeded far up into the mountains and accomplished the enormous labor necessary to make the park accessible to motorists using the entrance highway. The personal sacrifices involved in this enterprise were great, and I want to express here publicly to the Cody people, as I have already expressed it personally, our deep appreciation of their efforts.

On July 1, under legislation already mentioned, the National Park Service assumed control of all of the improvement work in the park, taking over all equipment, supplies, and construction materials from the Engineer Corps of the Army. Many of the civilian personnel were also transferred to this service. Since then special attention has been given to the maintenance of the roads of the park and the highways intrusted to our care. Frequent rains of short duration materially aided the road-maintenance work. It is generally reported that road conditions already reflect the judgment and



A. LONGS PEAKE FROM THE TWIN SISTERS, LOOKING ACROSS TAHOSA VALLEY.

The peaks from left to right are Mount Meeker, elevation 13,911 feet; Longs Peak, elevation 14,255 feet, and Mount Lady Washington, elevation 13,269 feet.

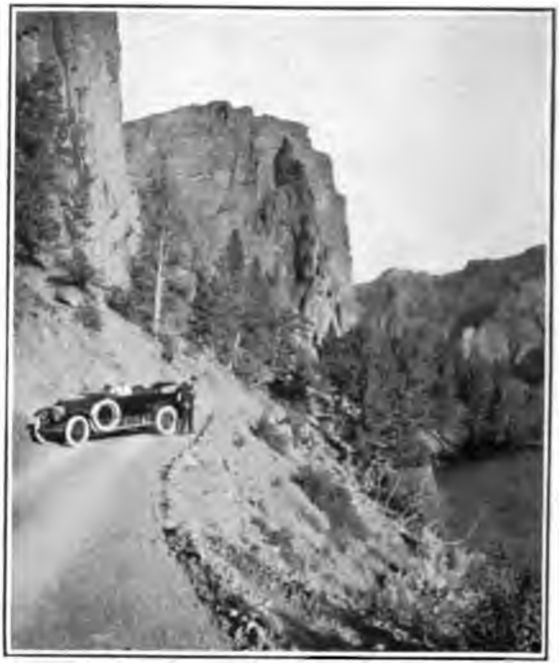


Photograph by Wiswall Brothers.

B. GRAND LAKE AT THE WESTERN GATEWAY.

The completion of the Fall River Road will give easy access to this beautiful country on the west side of the mountains.

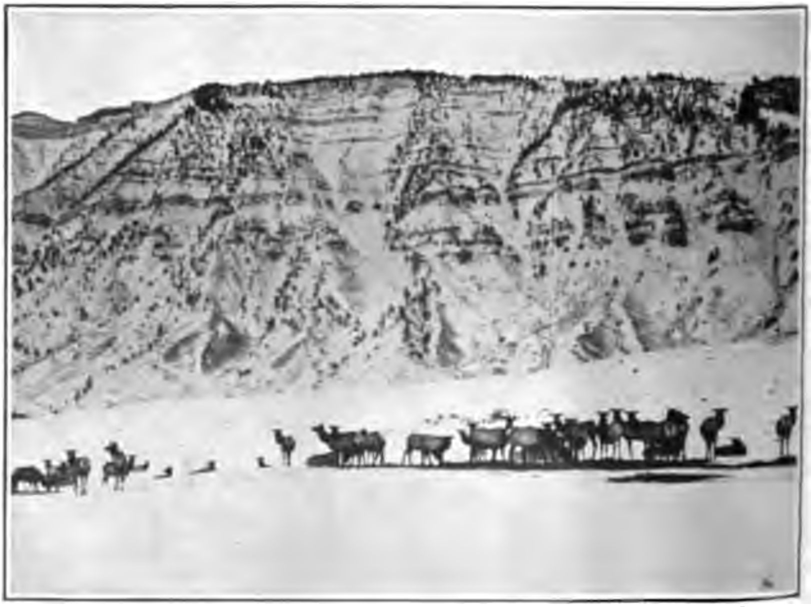
ROCKY MOUNTAIN NATIONAL PARK.



Photograph by J. E. Haynes.

A. SENTINEL ROCK ON THE CODY ROAD.

This road is maintained by the National Park Service.

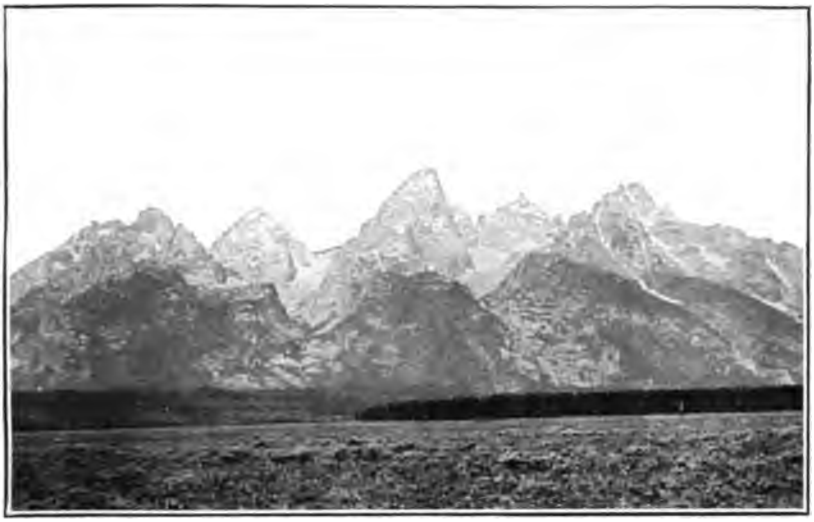


Photograph by J. E. Haynes.

B. FEEDING HAY TO ELK, WINTER OF 1918.

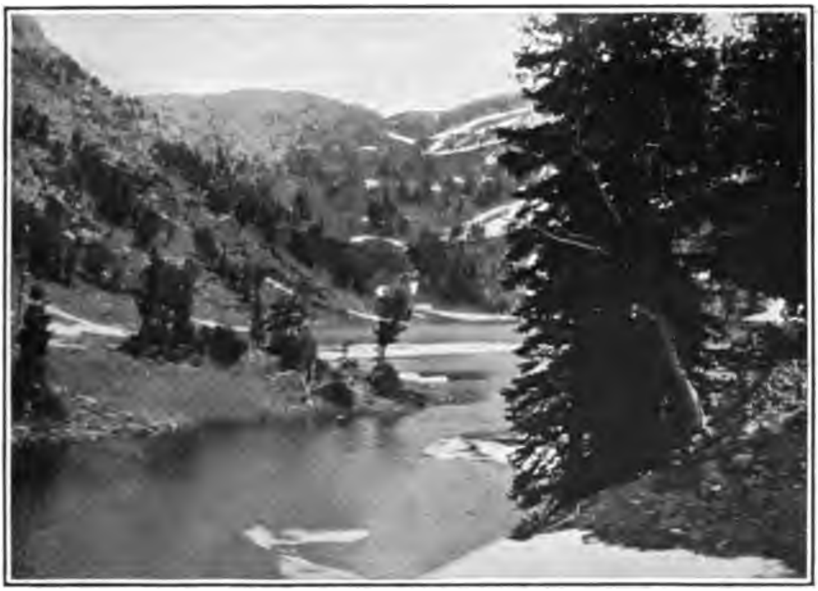
Section of the feeding line below Mount Everts.

YELLOWSTONE NATIONAL PARK.



A. SKY LINE OF THE TETON MOUNTAINS.

The peak on the right is the Grand Teton, elevation 13,747 feet. The proposed new boundary of Yellowstone National Park passes along the crests of the Tetons to the peak on the left, thence down about its center to and including Taggart Lake lying at its base.



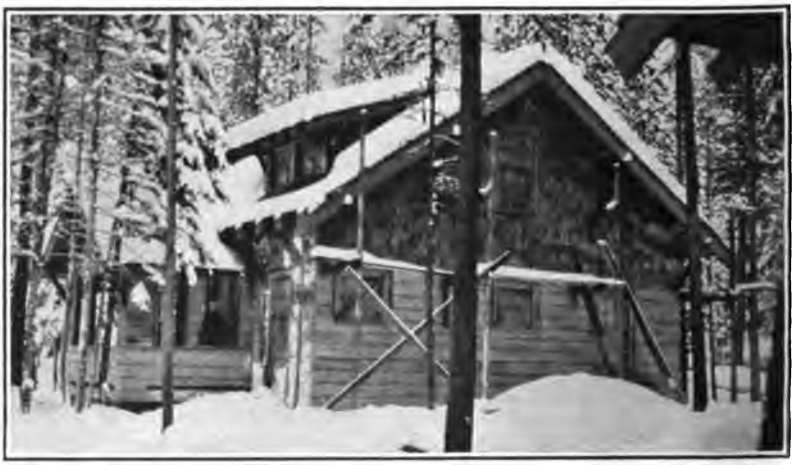
B. LAKE AT THE HEAD OF SODA CREEK, A BRANCH OF THE NORTH BUFFALO FORK.

This lake lies about 14 miles directly south of the present southeast corner of the park.

SCENES IN THE PROPOSED ENLARGEMENT OF YELLOWSTONE NATIONAL PARK.

Looking across Logan Pass at Clements Mountain and Clements Glacier. The new Logan Pass Trail completed in 1918 crosses the Continental Divide through Logan Pass.

On top of the Garden Wall overlooking Grinnell Glacier, Mount Gould in the distance. Reached by new foot path from the Granite Park chalets.



TYPE OF COTTAGE BEING CONSTRUCTED ON NEW ADMINISTRATIVE SITE NEAR BELTON.

GLACIER NATIONAL PARK.

wisdom of placing all activities in Yellowstone National Park under the control of this bureau.

Swollen streams also caused severe damage to the roads and bridges south of Yellowstone Park. In the Wind River and Hoback regions and in the lower Jackson Hole a change in the channel of the Snake River temporarily cut off the town of Jackson from the railroad terminus at Victor, Idaho. South of the park the loss of the Buffalo Fork bridge cut off the approach from Lander which had been promoted with much energy the year before. It is essential that this bridge be restored at an early date and an estimate is being submitted to Congress, with your approval, for a new structure to span the Buffalo Fork at this point. Should all of the boundaries of Yellowstone Park be extended southward this new bridge will constitute one of the points of access to the park.

NORTHWESTERN AND NORTHEASTERN GATEWAYS.

Another road that is deserving of development is the highway entering the northwestern corner of the park, passing up the Gallatin Canyon, over the divide into the headwaters of the Madison River and down Grayling Creek to the vicinity of the western entrance gateway. This highway is very important from the scenic standpoint. It is destined to be one of the great automobile approach roads to Yellowstone Park. It is estimated that it will cost approximately $150,000 to adequately improve the part of the road lying north of the park and negotiations are in progress looking toward accomplishing this work through cooperation with Gallatin County and the State of Montana under that part of the Federal aid roads act which provides for the improvement of highways in the national forests. Should this cooperative project be approved it is our intention to put that part of the highway which runs through Yellowstone Park into excellent condition. If possible, this road will be continued to a connection with the western approach road. The Gallatin road connects the thriving city of Bozeman with the Yellowstone Park just as the road up the Yellowstone River connects Livingston with the main northern gateway.

Another road of great importance as a highway for motorists is that which connects the Tower Falls with the mining community of Cooke City. This road follows the Lamar River to Soda Butte Creek, thence up the scenic canyon through which this stream flows to the northeast corner of the park. The scenic charm of this part of the park is little known, but it is destined to become one of the most popular resort districts. The mountains are highly colored and wonderfully carved by water erosion. Here alone in the Yellowstone we have the picturesque granite landscape typical of the Rockies, the rest of the park being volcanic. This is the region of the extraordinary Grasshopper Glacier, Lake Abundance, and other magnificent natural features still accessible only to the hiker and horseman. The automobile road, however, leads the visitor to lakes and streams abounding with fish, and wild animals can be seen along the route in large numbers.

NEW MEASURES FOR WILD-LIFE PROTECTION.

In the valley of the Lamar lies the big buffalo farm where nearly 400 bison range under conditions approaching those normally obtained on the plains, the ancient home of this distinctly American animal. Yellowstone Park is one of the most important game sanctuaries in the world. Some of the principal duties that the National Park Service has to perform in this park relate to the care and protection of the many species of the native fauna that inhabit this region. Of special importance are the great herds of elk, antelope, and moose. During the past year all of the animals of the Yellowstone have thrived under favorable weather conditions and the protective measures of the National Park Service. An intensive campaign to destroy predatory animals, such as the wolf, coyote, and mountain lion, has met with gratifying success.

The work of preparing, plowing, and seeding additional land for the raising of hay to be used in the event of extraordinarily cold winters accompanied by unusual snows has gone speedily forward. The problem of protecting several species of animals in winter, notably the elk and antelope, is one that is constantly calling for the final solution, and so far this has not been reached, although effective measures have been taken to protect these animals against the rigors of winter. When the snow becomes too deep, these herds drift over the boundaries in several directions. Where the adjoining lands have been grazed by sheep or cattle, there is no forage left for the park animals.

Unfortunately, in the past there has been considerable grazing on the natural winter range in the national forests. At the present time, however, large areas of these feeding grounds have been withdrawn from use as pasturage for domestic stock, and an investigation is in progress by the Forest Service to ascertain under what condition the land should be withdrawn from this use in the interest of game protection. The extension of the boundaries of the park to the Buffalo Fork of the Snake River, as now proposed, will reserve all of the summer range and considerable winter grazing land for the Southern or Jackson Hole elk herd. It seems essential, however, that if this elk herd is to be protected against all adverse conditions of the future the winter feeding grounds near Jackson, Wyo., should be greatly enlarged, probably by the purchase of a number of ranches and other private holdings. The same course will be necessary in the case of the northern herd, in which event land now withdrawn in the Canyon of the Yellowstone River between Absaroka and Gallatin National Forests should be supplemented by the purchase of private lands north of the park and in this reserved area. At the close of the war, even perhaps before, plans will be completed and arrangements will be made for carrying into effect this additional protection to the elk.

It is the aim of all who are interested in the protection of the Yellowstone herds that this great park shall provide the place for the propagation of all of the species of animals now found within its borders, but it is also our hope that these animals will so increase that there will be a constant overflow into adjoining territory, thus providing sport for the hunter for years to come under appropriate State laws. In accomplishing these purposes the close cooperation of the States of Montana and Wyoming, the Forest Service, and the National Park Service is absolutely essential. This cooperation must extend not alone to the protection of game animals on legally established game reserves adjacent to the park, but it must extend also to the determined and effective stamping out of the unspeakable practice of tooth hunting, which unfortunately is still all too prevalent in winter just beyond the boundaries of the park.

YOSEMITE NATIONAL PARK.

Steady progress in permanent improvement is the keynote of the year in the Yosemite National Park. The large falling off in travel by rail was in some part offset by a material increase in the number of visitors by automobile; at the same time park forces and facilities were not heavily taxed, and there resulted a margin of time and effort, which was most usefully applied to preparations for the heavy seasons which the close of the war will surely bring.

Under the balances of last year's revenues and appropriations and the appropriation of $255,000 made for the current year, work of great importance for Yosemite's future has been accomplished. The most notable achievement was the completion of the new power plant, which is expected to fill the growing needs of the Yosemite Valley for a generation to come.

THE NEW POWER PLANT.

This plant, whose total cost of $212,000 was authorized under the congressional appropriations of July 1, 1916, June 12, 1917, and March 28, 1918, was continuously under construction from August, 1916, to its first operation on May 28 of the present year. It consists of a log crib diversion dam across the Merced River about a mile below the Pohono Bridge, with concrete head works opening into a 64-inch concrete pipe 400 feet long. This gives into a 54-inch redwood stave pipe which, in connection with a steel pressure pipe of the same diameter, delivers the water to the turbines under a head of 380 feet. The power house is equipped with the highest class of hydro-electric machinery. Two General Electric dynamos of 1,000 kilowatts each are connected with its two Pelton turbines. From here the current passes on a three-phase system to the main distributing point near Yosemite Village.

Your inability to dedicate the new plant upon your return from Hawaii postponed the ceremony until September 7 last, when a distinguished little company gathered with me for the addresses and the unveiling of the medallions. The plant was formally dedicated to the late Henry Floy, the electrical engineer of New York, whose voluntary study of the problem, whose report, and finally whose presentation of the proposition before the Appropriations Committee of the House were the factors which principally brought about its realization. I dwell upon the installation of this plant because in a way it symbolizes the new and greater function for which the Yosemite National Park is preparing, and which it will assume in the very near future.

The old electric plant in the Merced Valley above the Happy Isles will be sent, if Congress so wills, to the Sequoia National Park where it is capable of meeting the needs of the Giant Forest for many years.

RECONSTRUCTION OF THE EL PORTAL ROAD.

The enormous increase in motor travel to the park having long ago indicated to us the extreme need of bettering the roads in the Valley where all approaches concentrate, I submitted to Congress in 1915 estimates for the reconstruction of that part of the El Portal approach road which lies within the park. Under the substantial appropriations which resulted, four miles of the eight have now been reconstructed. The width has been increased to 20 feet, rock copings have been built wherever necessary, and ditches, culverts, and bridges have been provided for drainage.

Half of this most important work, then, is done, and $50,000 should be appropriated to carry it through the next season. This is the most important of Yosemite's immediate necessities.

NATIONAL HELP NEEDED FOR AN IMPORTANT STATE PROJECT.

In connection with this there is no new road proposition more important to Californian lovers of the Yosemite and to motorists visiting the State than the road outside the park which the California Highway Association projects between Mariposa and El Portal, for which it has allotted and made immediately available the sum of $175,000; this sum is estimated to be about 40 per cent of the total cost. The wide range of choice which this road will offer to motorists is apparent at a glance, and the proposition should receive earnest attention. To make this road a fact the assistance of the United States is necessary, and the California State Automobile Association and other organizations recently asked the Department of Agriculture to make allotments to assist it from the Forest Service allotments for the construction of highways through national forests.

So far the Department of Agriculture has not acted favorably for several reasons, the chief of which seems to be a doubt whether such a road would constitute a proper war-time expenditure.

Some solution favorable to the project must be found very soon or the State will withdraw the allotment for its share of the road in favor of road projects in other parts of the State, and a highway will be lost to the Nation which would have added enormously to the pleasure and benefit of motorists from all parts of the country, besides providing an approach to the Yosemite National Park which will be open the whole year.

IMPROVING THE VALLEY ROADS.

One of the important accomplishments of the year has been the widening of roads throughout the valley to 20 feet and their resurfacing with from 3 to 6 inches of river gravel. The improvement is notable. This brings up the subject, however, which some day must be squarely faced. This granite gravel disintegrates very rapidly under heavy travel, with resultant deterioration of surface.

Considering that in a war summer 7,621 cars visited the Yosemite last year, that after the war the number of visiting cars will increase very rapidly, and that in the nature of things the overwhelming majority of visiting cars always will make the valley their headquarters, the absolute need of hard, durable valley roads is apparent; the alternative is increasingly great sums spent every year on repairs to the surface. I myself think that eventually we shall have to lay concrete roads in the valley as a measure of economy.

MANY INTERESTING NEW TRAILS PROJECTED.

Three new trails were constructed during the season, two of which open up delightful new country above the valleys's rim. One of these cuts out lofty Vogelsang Pass from the trail between Lake Merced and the Tuolumne Meadows by breaking in through Babcock and Emeric Lakes and crossing the divide at Tuolumne Pass. It opens a new and lovelier country which is low enough to be useful after Vogelsang Pass is choked with snow.

Another new trail leaves the Tioga Road at the Yosemite Creek bridge and covers 8 remarkably scenic miles to the Ten Lakes Basin on the south rim of the Tuolumne Canyon, opening an exceedingly beautiful part of the canyon country to trail travelers who come by motor on the Tioga Road.

In connection with this trail, the suggestion made by William E. Colby, president of the Sierra Club, after consultation with Prof. J. N. Le Conte, former president, that this trail, if continued across the Tuolumne Canyon at Pate Valley, will offer a direct trail route from the Yosemite Valley into the magnificently scenic regions in the north of the park seems to me admirable. Doubtless there are living no two men as familiar as these with the incomparable wilderness of the upper levels of the Yosemite; certainly there are no others who hold the Yosemite in greater love and wiser estimation.

Prof. Le Conte, concurring heartily with the plan, expresses a preference for reaching Pate Valley by the old Indian trail from Harden Lake; at Pate Valley he would cross the Tuolumne and pass up a trail to be built through Piute Canyon to connect with the trail to Rogers and Benson Lakes. This plan, which is the result of personal investigation made last summer, has its sound reasons, and doubtless this trail will also be constructed in the near future. Two trail routes into the great northern wilderness are none too many for this period of its rapidly nearing discovery by the greater public; doubtless the next decade will see this grand country developed by a network of new trails constructed in response to direct demand.

The third trail built during the summer climbs Glacier Point behind Camp Curry. It is called the Ledge Trail for good reason. This work renders safe an exceedingly steep trail against the use of which we have been compelled to issue yearly warnings without avail; many have insisted upon using it in spite of warnings because it cuts the trip between the valley and Glacier Point to less than 2 miles, and there have been distressing accidents. These now will become impossible for those who use the most ordinary care.

THE TIOGA ROAD AND THE LAKE TAHOE LOOP.

Again last summer did the Tioga Road amply justify its purchase and presentation to the park system. Again did it prove the need and popularity of a motor gateway to the upper wilderness, which, previous to its opening, could be enjoyed only by the camper-out with pack train. Fifty or sixty automobiles a day traveled the Tioga Road last season, which means that, with the rapid increase of trail travelers, the Yosemite north of the valley's rim is rapidly coming into its own.

Especially popular was the motor loop tour from San Francisco across the Sierra through Placerville or Emigrant Gap to Lake Tahoe, thence by way of Gardinerville to Tioga Pass, over the Pass, across Yosemite National Park on the Tioga Road, and back to San Francisco by way of Stockton or Modesto. It will be noticed that Yosemite National Park as a park, that is, without any special consideration or use of the Yosemite Valley, also seems to be coming into its own. This is a good sign. The concentration in the valley has limits beyond which something vital is lost. The park north, east, and south of the valley rim has room for a million and few equals among scenic wildernesses.

This growth in the popular appreciation of the upper country has resulted in a pleasing increase in the number of camping parties in the Tuolumne Meadows and elsewhere throughout the higher mountain section. I look forward to the day when many motorists here, as in the Yellowstone, will bring camping outfits packed on their cars, and will enjoy this grand wilderness in the only way it can be enjoyed thoroughly. As compared with the Yellowstone, the advantage is all with Yosemite, inasmuch as the practical absence of rain in summer makes cumbersome tents unnecessary for camping out. The Sierra Club's annual outing was omitted this year for reasons connected with the war, but a large number of club members packed in and camped out individually.

Camping out, by the way, also increased greatly this year in the valley. The colony under the trees by the Merced some day may exceed its limits of cover.

DESTINY OF THE JOHN MUIR TRAIL.

The development of the upper levels of the park naturally calls attention anew to the continuing crest of the Sierra. The practical completion of the John Muir Trail, California's memorial to the great naturalist, follows it south from Yosemite into the noble country which is called "the Greater Sequoia" because it is proposed to add it to the Sequoia National Park.

This magnificent trail, literally a highway since as nearly as feasible it follows the crest, is a scenic progress of real sublimity all the way to Whitney's summit. Those who have followed it will realize that my prophesy, after five trips into this region, is founded upon a natural destiny, namely, that the time is not many years distant when these two great Sierra national parks, the Yosemite and the Greater Sequoia, will be made practically one by a natural development of this summit highway in response to popular demand.

Motorcycles were admitted to park roads last summer for the first time. While automobile travel exceeded expectation, the number of motorcycles was not great. It is possible that the grades of some of the approach roads outside the park may have been found stiff for all except the most powerful motorcycles.

UNFORTUNATE WILD-ANIMAL SITUATION.

As soon as peace is restored and cattle grazing is again restricted in Yosemite wild animal development will resume its interrupted pace. Deer retire naturally from companionship with cattle, and when cattle occupy 70 per cent of the available area the deer suffer severely. Few deer may now be seen in the Yosemite and these are in poor condition, apparently suffering from want of food. While these facts have been noted and reported only about deer, it follows that they are also true about all grazing animals, and, to a less degree, about wild animals of other kinds.

This condition is peculiarly unfortunate because the Yosemite was just beginning to show a favorable reaction from the devastation of the past. Any setback now will set back progress for years. Meantime other conditions favor. The measures taken to keep down mountain lions, coyotes, and other predatory beasts had begun to bear fruit in the increase of the harmless animals upon which they habitually preyed.

EXHIBIT OF MOUNTAIN LION CUBS.

The mountain lion, which is closely related to the panther that used to inhabit our eastern wildernesses a generation ago, is the subject of the greatest curiosity among Yosemite visitors, but as, in spite of his great size, he is the most timid and cowardly of beasts, it has heretofore been impossible to gratify this curiosity. Last summer's visitors and those of several seasons, at least, to come will be treated to actual demonstraton. Three lion cubs whose mother was killed in the early spring have been on exhibition in a safe inclosure and have been examined by thousands of visitors to the park. At six months of age these kittens are active and powerful beasts who love play and do not at all object to being petted and even held in one's arms, where, I can assure you from actual experience, one is quite enough at one time.

So far, they have received no raw meat. Raised at first on milk, they took kindly to bread and cereals and cooked meat. It is planned to amply and comfortably cage them before next season where they may be seen, then no doubt lusty adults, by all who enter the valley. A brown bear cub captured this season will be added to this exhibit of Yosemite's wild life.

Plans are also making for a museum in which mounted specimens of all park birds and animals will be displayed not only for the entertainment of visitors, but that visitors may identify here the creatures they may see alive in the wild.

FISH HATCHERY NEXT.

The increasing patronage of the Yosemite in recent years and in particular the extensive invasion of the wildernesses above the rim have created a trout situation which must be met promptly. There has been little fishing left in the valley for many years, and the lakes within a few hours trail journey are showing a falling off in catches. Even lakes in the far north of the park which have fairly swarmed with trout for many years are showing some effects of increased fishing.

With the practical disappearance of good fishing throughout the country generally, but not at all of the love of fishing, visitors look more and more to our national parks for their opportunity to enjoy a little really good fishing. A fishing rod is a part of the equipment of an increasing number of cars starting westward toward one or other of the parks, and many tourists by rail inquire about fishing as soon as they arrive. This public demand must be generously met.

For some years now Yosemite rangers whenever opportunity offered have transferred trout from native waters to streams or lakes which have been cut off by waterfalls from natural stocking—which has helped a little; and last year the California State Fish and Game Commission furnished 250,000 fry for the depleted valley streams and the waters adjacent to the Tioga Road.

But this it not enough. To restore the Yosemite and keep its waters stocked as Yellowstone's are stocked will require many times that many fish yearly. The answer, then, is a hatchery. To this end I have concluded a contract with the State commission by which it acquires a hatchery site near the Happy Isles. Construction will begin in the very near future.

CONCESSIONS.

The name of the Desmond Park Service Co. has passed with the closing of Mr. Desmond's connection with the management of its park concessions. The new name of the corporation controlling the camp west of Yosemite Falls, the Sentinel Hotel, the Glacier Point Hotel, the camps above the valley's rim, and the park transportation service is the Yosemite National Park Co. Last May the property and contracts belonging to this company were leased to Shaffer Bros., who successfully operated the properties until the close of their contract on September 30. The Yosemite Falls Camp, Camp Ahwanee, and El Capitan Camp were combined into one with several grades of service under the name of Camp Yosemite.

Meantime Camp Curry, which enjoyed a good season, considerably improved its group of central buildings and acquired the privilege of building canvas bungalows with bath and other facilities to correspond. The misfortune of the burning of the Hotel del Portal at El Portal would have proved a greater misfortune at the beginning of a season of normal railroad travel. A luncheon station was built in good time to care for that part, at least, of the functions of the old hotel. The hotel at Wawona has been enlarged and greatly improved.

The need of an adequate new hotel in the valley is very great indeed.

HETCH HETCHY CONTRACT SATISFACTORY.

Under a contract with the city of San Francisco affecting the building of the reservoir in the Hetch Hetchy Valley, which was executed during the summer, the private land and timber situation is greatly improved. The city owned 320 acres of land, a superb stand of sugar pine, within the park limits which it purposed to clear in part in order to provide the lumber necessary for building operations. To save the most of this timber and acquire title to the land for the park I effected an exchange with the city of the timber now standing on the lands which the Hetch Hetchy reservoir will submerge for its 320 acres of woodland. We permit the city to cut from this woodland what is necessary, up to 4,000,000 board feet, to supplement the cuttings from the Hetch Hetchy floor; and the city also agrees to clean out and remove all trees and brush from the land to be submerged in order that there shall remain no unsightliness in the new reservoir when completed and filled. The profit to the public service in the acquisition of 320 acres of woodland is apparent.

Those who were alarmed last summer by seeing living trees caught in the flooding behind the Lake Eleanor Dam may calm their fears. That flooding was temporary, and the city of San Francisco will duly clean out all trees and bushes before the permanent flooding of this reservoir, which is a part of the Hetch Hetchy project granted by Congress to San Francisco in 1913. This entire construction, a work at best of some years, has been set back somewhat by a war-created scarcity of laborers. We are taking every precaution to insure its completion with the least possible damage to the beauty of the neighborhood, even temporarily.

SEVEN THOUSAND ACRES MORE ACQUIRED.

Important land and timber exchanges which have been projected for several years with the Yosemite Lumber Co. have come to an issue during the last year, and the details of a contract definitely arranged. By its terms the company makes over to the park nearly 7,000 acres of privately owned land within the park boundaries in return for the marketable timber upon some of it and upon other Government land, the timber within park boundaries to be judiciously cut only under strict supervision by park authorities.

These additions to the public domain within the park are extremely valuable, as they insure the continuance of the magnificent virgin forests bordering the Wawona and Glacier Point roads. Those areas which will be lumbered under the contract lie well away from beaten lines of travel; moreover, they will be cut over with such discrimination that another generation will see their present beauty practically renewed.

This leads naturally to the consideration of two privately owned areas outside of park limits whose protection it is a public duty to secure. One borders the Big Oak Flat Road between its western park entrance westward to the crossing over the South Fork of the Tuolumne; the other borders the Tioga Road between its western park entrance westward to the same stream.

The magnificent forests of sugar pine and yellow pine which lead so nobly up to these park entrances are bound to fall under the ax unless help is quickly forthcoming. The Department of the Interior can not aid. Unless the Department of Agriculture or the State will acquire these road borders in exchange for timber as valuable elsewhere, they can only be saved by direct purchase authorized by Congress. This is a cause which private patriotism and public spirit may find well worth some effort.

Every wilderness has its early mosquito season and the Yosemite is no exception. It is believed that this can be greatly mitigated in the valley by the application of methods which have proved effective elsewhere. The experiment will be tried next season in the interest of the early visitors.

SEQUOIA NATIONAL PARK.

The discovery of a large limestone cave was the most striking event of the year in the Sequoia National Park, striking because of the cave's immense size, the magnificence of its passages and chambers, and the mystery of its unsuspected existence only a short distance from well-patronized trails. It is remarkable indeed that a gaping entrance 15 feet high and 27 feet wide should never have been seen by mortal eye until two anglers, A. L. Medley and C. M. Webster, accidentally passed it on a late April trouting trip.

The cave became the sensation of the season, and justly so because of the size and richness of its limestone decorations and the fantastic quality of its formations. It penetrates a mountain of white limestone. Explorers have entered 4,000 feet so far, and it is evident that there is much yet to see after certain openings have been enlarged; in fact, we may find a mountain of caves.

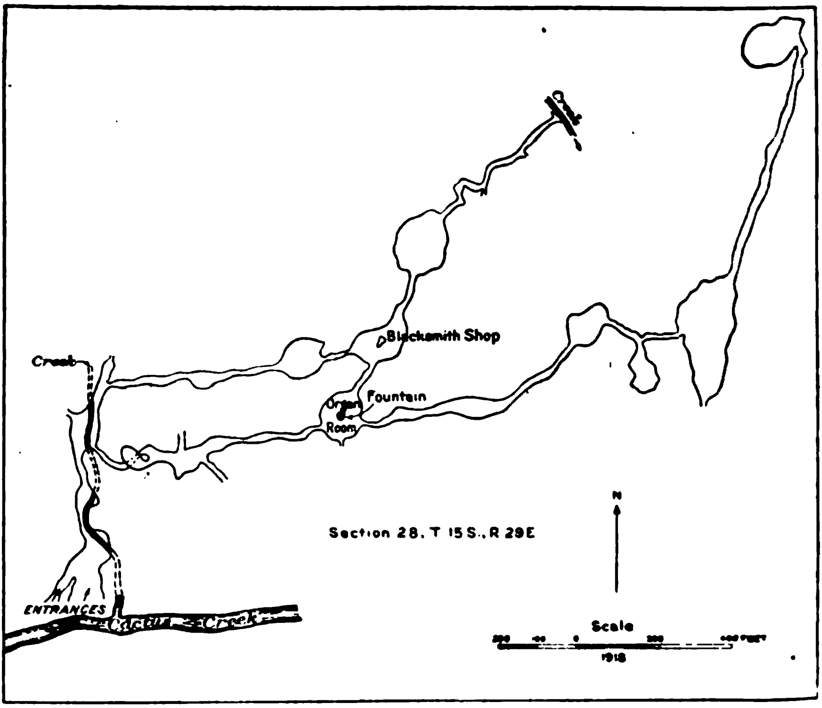


FIG. 2.—Underground survey of Crystal Cave.

A personal investigation of the cave during the summer determined me to take immediate precautions for its preservation. Arrangements are being made to build a gate which can not be passed without a Government guide, who shall protect not only the visitors against losing their way in the cave, but also the cave against the memento habit of many visitors. It is our purpose to see that it retains its wonderful pristine beauty to the full.

One of the many wonders is the so-called organ room, which contains formations giving out a full range of resonant notes when struck, so that a musician can easily play a tune after a little selection of the proper stones. Because of the rich quality of its walls, the cavern has been named Crystal Cave.

A beautifully illustrated article from the pen of Assistant Attorney General Huston Thompson, who accompanied me through this cave in September of this year, will appear shortly in the National Geographic Magazine.

VALUABLE ROAD IMPROVEMENTS.

The season has left roads considerably improved both without and within the park. Tulare County is to be warmly congratulated on the public spirit and energy which resulted in the building of a new concrete road from Visalia to Three Rivers. This in itself will guarantee a very large increase in travel next season to the Sequoia National Park. From Three Rivers up the road will need considerable improvement, but by a careful handling of the traffic it can be made to answer for the present or until the end of the war gives opportunity to go ahead with the regular road improvement.

Naturally extensive repairs to these approach roads resulted in lessening travel during the summer just past, but the nature of the improvement probably will more than compensate for the loss next summer alone, to say nothing of the many seasons of the long after-life of the concrete surfacing.

Within the park the principal improvement was the extension of the end of the road leading from the Giant Forest to the Marble Fork, a distance of about a mile and three quarters. This enabled us to open up a new automobile camp where good fishing was available, relieving the pressure on the Giant Forest camp. A 16-foot bridge with an 80-foot span was built to carry this road over the Marble Fork.

This road is a section of the proposed highway extension between the Sequoia and General Grant National Parks which, when completed, will penetrate a magnificently scenic part of the High Sierra, passing through exceptional forests, even for this country, and making many camp sites available where excellent fishing may be found. The area lying between the parks, of course, can not be crossed under national parks appropriations. We are depending upon the county to construct this connecting link.

Many miles of existing roads were resurfaced.

Nearly every future visitor to the Giant Forest will profit by the wooden stairway which was raised 346 feet to the top of Moro Rock, where a magnificient view is obtainable of the High Sierra on the one side, and the Sierra foothills on the other. Hand rails will help the climbing of a summit which was heretofore accessible only by well-accustomed mountaineers. Other improvements included the building of a large stable garage and the fencing of five meadows for the use of trail horses for park visitors.

Time also was found for much clearing up of forests for fire protection, including many acres of heavy sequoia growth in the Giant Forest. The splendid sequoia groups which have come under the ownership of the park by purchase out of congressional appropriations and the gift of the National Geographical Society were specially safeguarded. A hundred miles of trail, including the long

South Fork trail across the park to the eastern boundary, were cleared up and repaired. All this was additional to the insect-control work, under the supervision of the Bureau of Entomology, which obliged us to sacrifice 52 yellow pines and 27 sugar pines in the Middle Fork Valley of the Kaweah River for the better protection of the forest generally. It was, indeed, a busy season.

YOSEMITE'S OLD POWER PLANT NEEDED HERE.

Now that the Sequoia National Park has been discovered by the motorists, its rapid development is to be looked upon as a natural and necessary consequence. Already the need of a new and large administration building is pressing, and must be forced at the close of the war. The Giant Forest camp, too, is entirely inadequate to properly care for the people who now crowd it, to say nothing of the expansion of patronage confidently expected in the next several years.

By way of beginning the new order, the installation of Yosemite's new power plant offers an excellent opportunity to supply one expensive need to Sequoia at small cost, for the old Yosemite plant, if brought to the Giant Forest, will meet its needs for years to come. This plant is now useless. Congress no doubt will see the advantage of appropriating the necessary funds for its movement and installation.

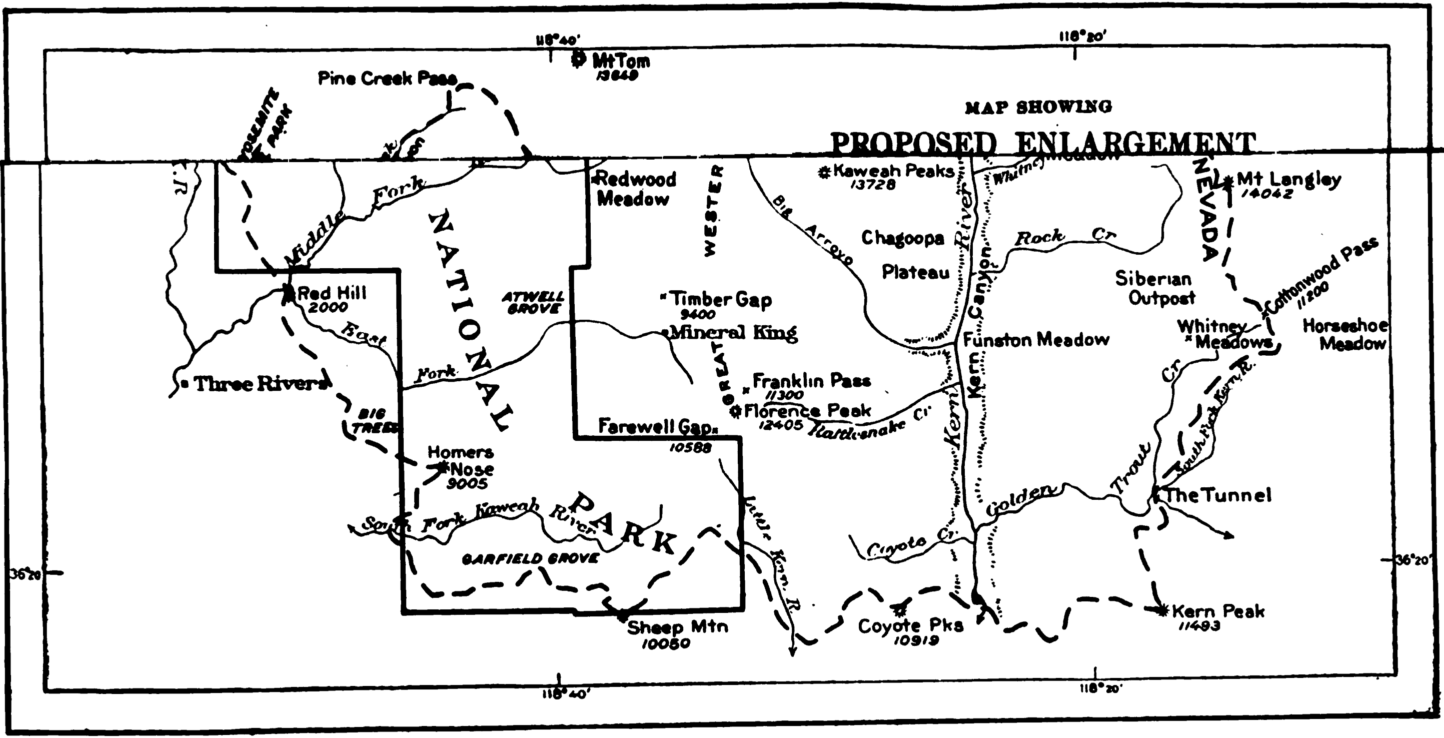
Possibly some of the surplus power from this plant may be diverted for the lighting of Crystal Cave. A system of indirect lighting by electricity, if properly worked out, will avoid the use of candles and torches, which can in time seriously mar the glorious freshness of the cave's white beauty.

THE GREATER SEQUOIA.

During the summer I took occasion for the fifth time to enter the supreme region north and east of the Sequoia National Park which we call "the Greater Sequoia" because nature manifestly intended the two regions to be necessary parts of one whole. My visit this time to the top of Kearsarge Pass, where the scenery is as inspiring as any in the world, has enabled me to cover with some completeness the entire region involved.

Let me therefore say right here that every visit has tended to convince me the more thoroughly that this proposed addition is surpassed in nobility and grandeur by the "show scenery" of no other accessible part of the world. Let me say that the more extensive my knowledge of scenery of the sublime quality becomes, the more clearly I see the superlative quality of "the Greater Sequoia." Let me express the belief that no local consideration whatever should be allowed to prevent the addition of this wonderful area of the Sierra's climax to the group of the Nation's greatest spots, for, in addition to the national and international fame it would bring to California as a national park, it would surely bring new business which would quickly amount to very many times the local losses, if local losses should follow.

National interest is growing slowly but surely in this great plan, which some day is bound to be realized. William E. Colby's testimony before the subcommittee of the Public Lands Committee of



MAP SHOWING PROPOSED ENLARGEMENT

the House last June, which will shortly be published, is especially valuable as being the opinion of an accomplished mountaineer who is thoroughly familiar with the Sierra. Mr. Colby, who is a distinguished specialist in mining law, was in charge of the summer tours of the Sierra Club for many years before assuming, a year ago, the presidency of the club.

GENERAL GRANT NATIONAL PARK.

It is impossible to consider any of the Sierra parks without reference to the "Greater Sequoia" project, and so it happens that, before discussing the season's news from the General Grant National Park, we naturally think first of its probable part in the realization of this great plan. That part is at once evident. With the monster sequoia from which it derives its name and its magnificent surrounding grove it will become the "Greater Sequoia's" impressive northern entrance as naturally as the Giant Forest is destined for its southern entrance.

To accomplish this it would, of course, be necessary to set aside a strip of territory to connect General Grant Park with the "Greater Sequoia." This leading at once to the King's River Canyon, would compete with the Giant Forest entrance in popularity.

It would also be possible, entering there into the King's River Canyon, to swing southward through the Giant Forest and out by way of Three Rivers and Visalia, an interesting loop indeed for motorists traveling the San Joaquin State Highway who care to vary their progress with a few glimpses by trail of the scenic wonders of the Sierras. The future possibilities of laterals from the main State highway, like these roads to General Grant National Park and the Giant Forest, are very great, as motorists already are beginning to perceive.

The General Grant forests were never more beautiful than last summer. Motorists flocked to them in increasing numbers, and private camps dotted the forest glades everywhere.

The public camp concession was granted this year to the General Grant National Park Company, represented by Mr. Worth Ryder, who also conducts the hotel in the Kings River Canyon known of old to frequenters of Sierra trails as Kanawyer's. The season was a reasonable success, and many who availed themselves of Mr. Ryder's triweekly saddle and pack train service up the South Fork of the Kings River became the pioneers of the future northern entrance to the "Greater Sequoia."

The year's improvements were on a small scale; the installation of a mile of additional water piping in the tourist camp ground together with drinking hydrants and five shower bath houses was the principal new work. These improvements are meeting the most insistent present demand of the park by providing comfort for the numerous campers who come up from the hot valley to enjoy the cool and glory of these great woods.

The landscape engineer is studying plans for a new entrance gateway. A new administration building, new and larger camp grounds, and the extension of roads and the water system are immediate after-the-war needs.

MOUNT RAINIER NATIONAL PARK.

The tourist season in Mount Rainier National Park has developed some very interesting facts. The proximity of the great Army cantonment, Camp Lewis, gave promise of greatly influencing the volume of travel to the park, and preparations were early made to accommodate the expected hosts. Hardly had the gates of the park opened for travel when the 91st Division, in training at Camp Lewis, was sent to France. New troops began to assemble shortly afterwards, but they were in quarantine for a fortnight after arriving and the opportunities to receive guests were consequently few. Estimates of travel to the park were hastily cut, but visitors continued to come in great numbers regardless of the situation at the cantonment, and at the end of the vacation period we find that the total number of people who enjoyed an outing within its confines is very materially in excess of the travel figures of any previous year.

The season was longer this year in all sections of the park. The opening of the National Park Inn at Longmire Springs was marked by a dinner and ball in honor of the commanding officer at Camp Lewis, and a snow carnival in Paradise Valley was the event that induced an early opening of the beautiful new Paradise Inn for its second season. The winter sports continued about the inn until the melting of the snow caused the devotees of the toboggans, skis, and coasting trousers to move farther back on the mountain to other snow fields and the old reliable Paradise Glacier.

There was little travel by train to Mount Rainier Park this year; practically all visitors making the trip from Tacoma or Seattle by private automobile or by means of the regular motor transportation service.

HOTEL AND CAMP IMPROVEMENTS.

The Rainier National Park Co., the general concessioner that developed the transportation lines of the park and constructed Paradise Inn and the Glacier Camp, bought the National Park Inn at Longmire Springs from the National Park Hotel & Transportation Co. This transaction was completed in April, and the purchaser took possession immediately. The acquisition of the property brought all facilities for housing visitors in the park under a single management except the hotel on the old James Longmire patented placer mining holding, which was constructed and is now being operated by a Tacoma firm.

Visitors were well cared for despite the fact that unprecedented crowds sought accommodations at week ends, and taxed to the limit the capacity of the hotels and the tents utilized in connection with them. Traffic management was greatly facilitated by the through telephone connection between Tacoma and Paradise Valley made possible by the purchase of the line from Ashford to Longmire Springs by the National Park Service, and the subsequent construction of a new line from Longmire to Paradise Valley. The importance of this improvement of the telephone system can scarcely be overestimated.

Many improvements were made in the Paradise Inn prior to the 1918 season, and each has added greatly to the attractiveness of the interior of this structure. Dead trees from the Silver Forest have been freely used in these embellishments. The lobby and dining room of Paradise Inn with their outlook upon Mount Rainier and the serrated Tatoosh Range can not be surpassed by any resort hotel that I have had an opportunity to inspect. The owners of this property will continue to add to its charm, using, wherever possible, native building materials.

In the early future, the concessioner will build a new central building for its Paradise Camp and lunch pavilion, and at the same time it will move its tent equipment to the site of the new camp not far distant from the Inn. This improvement will afford better camping facilities, and will make possible the clearing away of all remains of the old camp on the eminence between Nisqually Glacier and Paradise Valley proper which has so long impaired the sky line of this ridge.

Paradise and Nisqually Glacier Camps with their lunch pavilions and a-la-carte service fill an important need in this park. The Paradise Camp is especially popular because here the tourist is at liberty to live under almost any conditions that he may choose. He can live in one of the tents of the camp, using his own bedding and cooking his own meals, or he can rent bedding at a nominal price and eat at the lunch pavilion; or he may bring his own tent equipment and eat at the lunch pavilion or purchase his supplies there and do his own cooking. Prices in all of these camps are as low as it is possible to make them in the interest of good management. Indian Henry's Camp was operated part of the summer, but was closed early owing to the fact that the horseback trip to this point did not indicate sustained popularity.

NEW FACILITIES FOR CAMPING OUT.

During the past two seasons more attention has been given to the development of free camp grounds in this park than ever before. Approximately $8,000 has been expended in clearing camp sites and installing sewer and water systems and other conveniences of this character. Especially interesting is the development that has been completed at Longmire Springs, where beautiful camp grounds have been laid out in a virgin forest. Excellent camping areas are now available at the Nisqually entrance to the park, at a point approximately a mile east of the gateway, and at Longmire Springs, Van Trump Park, and Paradise Valley.

Camping is what a large percentage of visitors want to undertake. It gives them the complete change in mode of living that many need, and furnishes delightful experiences of numerous varieties to all who take this method of enjoying the out-of-doors.

MANY NEW TRAILS.

The development of horseback trips from Paradise Valley during the season was very gratifying. The new Sky Line Trail leading from Paradise Inn over timberline ridge to Sluiskin Falls, thence over Mazama Ridge to Reflection Lakes, thence to Narada Falls, and return to Paradise Valley, offered the most popular side trip of the season. The new Tatoosh Trail, now under construction, which begins at Narada Falls and ascends the Tatoosh Range by way of Tatoosh Creek and the beautiful alpine park at its head, thence along the summit of the range to Unicorn Glacier, thence descending to Reflection Lakes, will be equally popular next season. The combined trip over the Tatoosh and Sky Line Trails may be made comfortably in one day, but it is hoped that these and other new trails that will soon be built will result in extending the period of time that visitors will spend in this beautiful part of the park.

Trail trips were under the efficient guidance of trained mountaineers, one or two of whom were women. Illustrated lectures on the park, its glacial system, its wild flowers, and trails were given regularly by the chief of the guide service, an able and enthusiastic high school professor possessing a deeply rooted devotion to the mountain. Guides, principally women, were also employed to conduct studies of the wild flowers and other plant life while making short walking trips from the hotel and camps in Paradise Valley. These educational features of business in Mount Rainier Park will become increasingly important, and in time the demand for "nature guides" will require the employment of a large force of these outdoor teachers. Thus, an idea originating in Rocky Mountain National Park is gradually being adopted and put into practice in other members of the system.

The new trail from Crater Lake to the Carbon River by way of Ipsut Pass has been completed, thus shortening the trip between the Nisqually entrance and the Carbon River Ranger Station by approximately 15 miles.

Although the trail system encircling the mountain was early repaired and put in excellent condition for travel, it was rarely used this summer, probably for the reason that few visitors to the park were taking the long vacations necessary to make this wonderful tour comfortably and satisfactorily. The well-constructed shelter cabins along these trails are an important feature of the development of the park in the past few years.

I have traveled around Mount Rainier on this thrilling trail system, and I consider it one of the greatest horseback trips that the national parks offer. The varieties of plant and animal life to be seen, the exquisite beauty of the many alpine parks, and the ever-changing panorama of glaciers and rugged mountain masses afford inexpressible pleasure. During the fiscal year ending June 30, 1918, approximately $15,000 was expended in the improvement of this magnificent trail system.

ROADS GREATLY IMPROVED.

The roads as well as the trails have been in an excellent state of repair. The reconstruction of the Nisqually River Road is now completed. This work has cost in the past five seasons more than $110,000, over $35,000 of which has been expended since July 1, 1917. The recent work included the building of very attractive rustic bridges over Tahoma and Kautz Creeks. The Tahoma Creek bridge is worthy of special mention. It is built of cedar logs and has a span of 60 feet. The entire road is now in a magnificent condition for motoring.

The amount of traffic that this highway is required to sustain in the course of the tourist season will make necessary the performance of considerable maintenance work each year. It must be remembered that every mile of this road is used by practically every vehicle entering or leaving this portion of the park. In many of the parks where motor traffic is heavy circle trips are feasible, but until the Nisqually

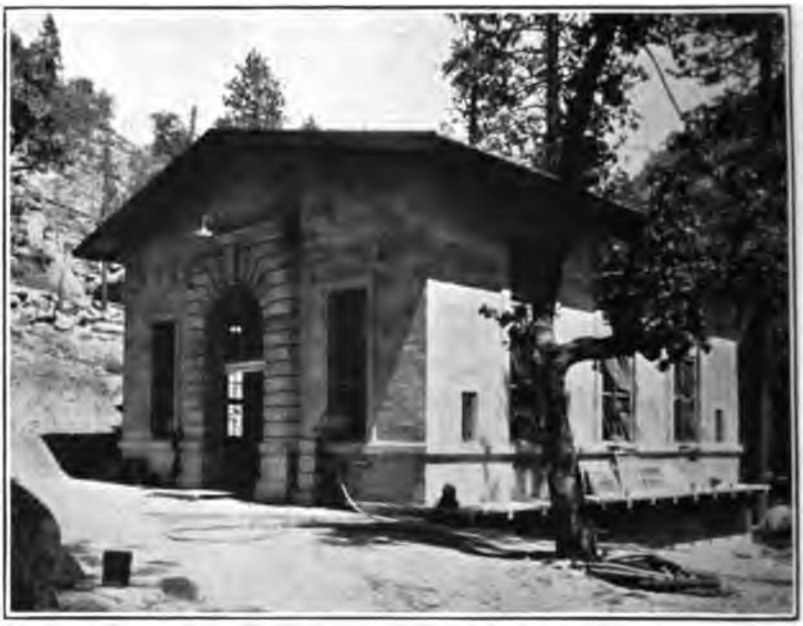
A. SECTION OF TRAIL FROM THE RIM TO THE BOAT LANDING.

Built in 1917 and opened to the public this season. In 1918 for the first time a horse drank the waters of Crater Lake.

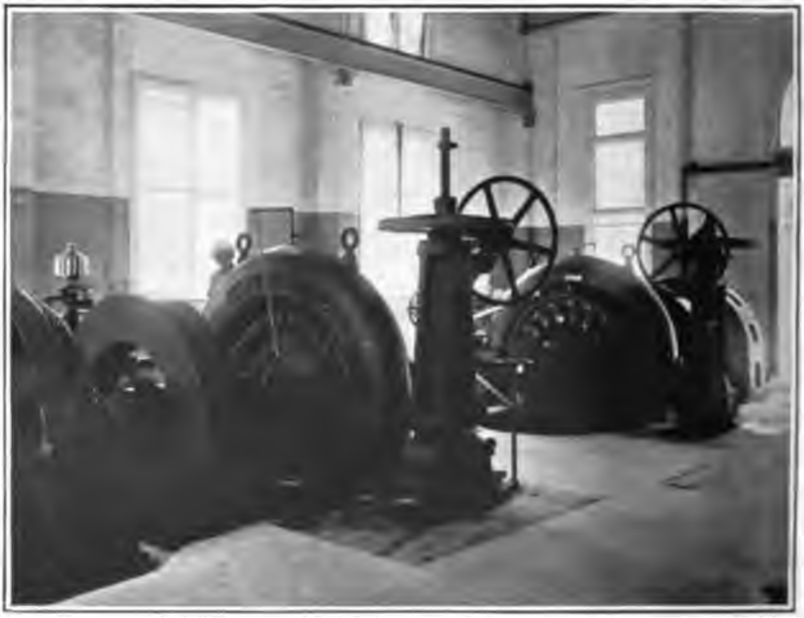
Photograph by Scenic America Company.

B. FISHERMAN'S HAVEN, WHICH THE NEW TRAIL HAS MADE EASY TO REACH.

CRATER LAKE NATIONAL PARK.



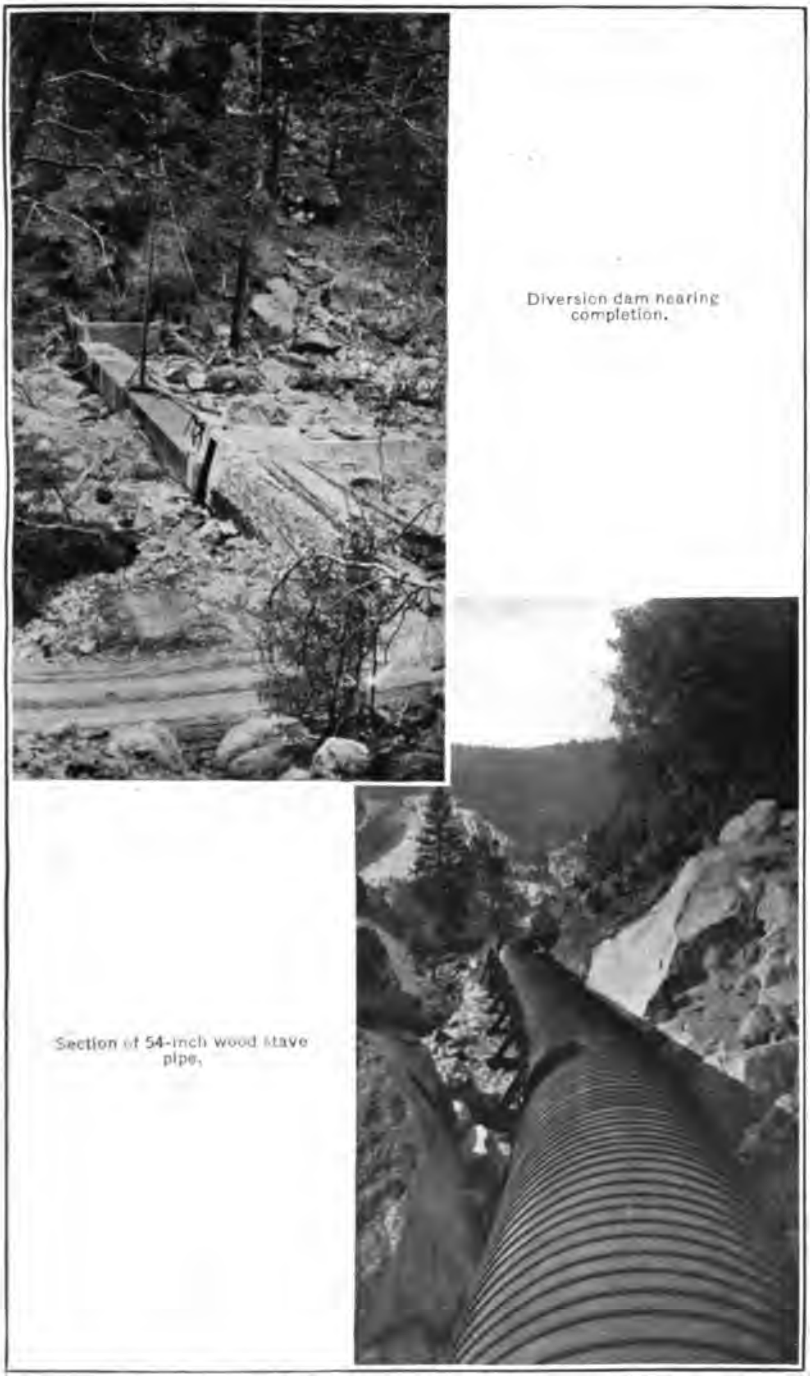
A. Reinforced concrete power house.



B. Turbine and dynamo assembly.

YOSEMITE POWER PLANT.

YOSEMITE NATIONAL PARK.

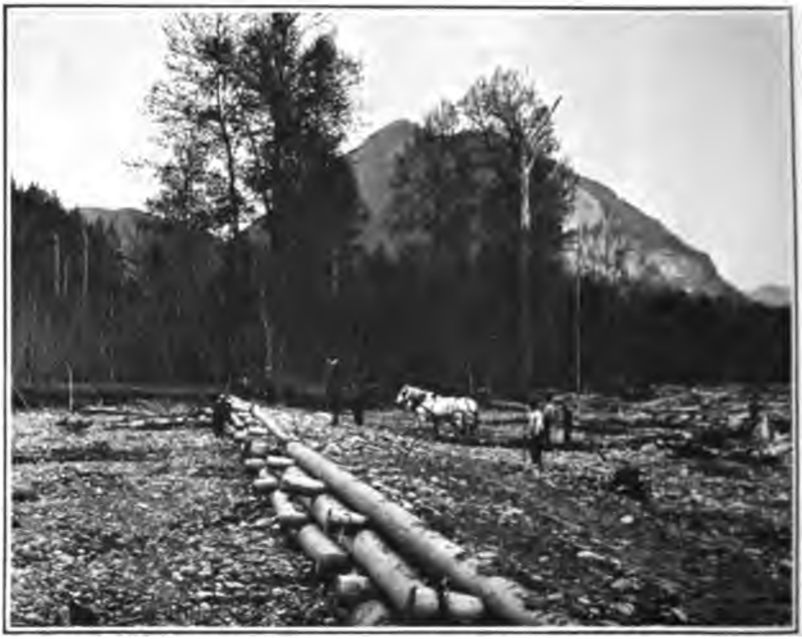


Diversion dam nearing completion.

Section of 54-inch wood stave pipe.

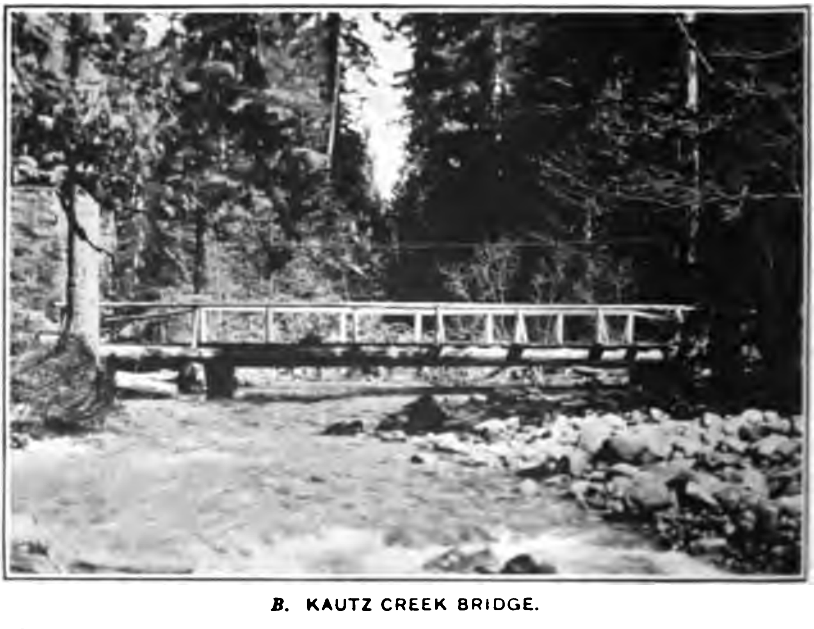
YOSEMITE POWER PLANT.

YOSEMITE NATIONAL PARK.



A. LOG CRIB DAM IN THE NISQUALLY RIVER.

Five feet high by 350 long, built in May, 1918, as a measure for flood protection.



B. KAUTZ CREEK BRIDGE.

Forty-foot span of 5-foot cedar logs. Built in May, 1918, and replaces the bridge destroyed by 1917 floods.

MOUNT RAINIER NATIONAL PARK.

River Road and the White River, or Storbo, Road are joined, or a connection is made with a road up the Carbon River, trips of this character will be impossible in Mount Rainier Park.

The road up the White River in the northwestern section of the park has been given special attention and is now in a fair condition for motor travel. It is not being extensively used, however, because the McClellan Pass Highway has not been completed to the park line. It is finished as far as The Dalles, 29 miles from Enumclaw. Until the 10-mile section between this point and the park boundary has been improved travel will necessarily be limited. Money is available for finishing this State road, but no further improvement will be accomplished during the period of the war.

At the end of the war the construction of the Carbon River Road should be undertaken immediately, and it is expected that the State will be prepared to cooperate with the Federal Government in the building of this new highway to the extent of bringing its road up to the boundary of the park near the northwest corner.

DESTRUCTION OF DOUGLAS FIR.

All visitors to the park felt a keen pang of regret that since the close of last season further destruction had been wrought in the beautiful Douglas fir forests along the county road leading to the park from Tacoma. A strip of timber, approximately a mile in length, bordering both sides of the road had been recently cut, and the débris left upon the conclusion of the operation presented a depressing sight. There is still time to save considerable stretches of timber along this road, but the owners of this property may not be expected to hold it intact indefinitely, particularly in view of the fact that nothing has been accomplished in the past in the way of buying timber for the purpose of preserving the sylvan beauty of this road. It is very gratifying to me that the West Coast Lumbermen's Association, meeting in Paradise Valley on July 27, should have unanimously adopted a resolution pledging its support to any plan that would preserve strips of the remaining Douglas firs along this approach road.

In view of the difficulty in collecting funds for the purchase of this timber at the present time it seems that legislation looking toward its exchange for timber of equal value in the national forests presents the only means of accomplishing our purpose in the early future. It would be a national calamity if a portion of this timber can not be preserved for posterity.

The boundaries of Mount Rainier National Park, when established, were carefully limited to include the mountain and its buttresses and no thought was apparently given to making this reservation a sanctuary for wild life. It did, however, result in protecting numerous species of mammals, including the Rocky Mountain goat, bear, and deer. The altitude of the park, however, is so high that the deer are compelled to leave its boundaries to find winter sustenance. Outside of the park these animals are not properly protected, and, as expressed in last year's report, we hold the view that the State of Washington, or the counties adjoining the park, should establish game preserves of reasonable area to which the deer may repair for winter range. The establishment of an adequate game preserve of

CAMP GROUNDS ON THE RIM GREATLY IMPROVED.

The public camp grounds on the rim of the crater were greatly improved during the summer season. A large tank and pumping equipment have been purchased and will soon be installed for the purpose of supplying water to campers on the rim grounds which are located a short distance west of the hotel in a beautiful alpine park area commanding a wonderful view of the lake. Heretofore water has been taken from the very inadequate hotel supply. The camp grounds will be equipped with shower baths if the water supply can be developed as expected. In this park, as in all others, special attention is constantly given to maintaining public camp grounds in a thoroughly sanitary condition.

The accessibility of the new Rim Road, and all of the new trails from this camping area on the rim of Crater Lake should make it one of the most popular camping grounds in the national park system, and should attract the pedestrian and horseman as well as the motorist.

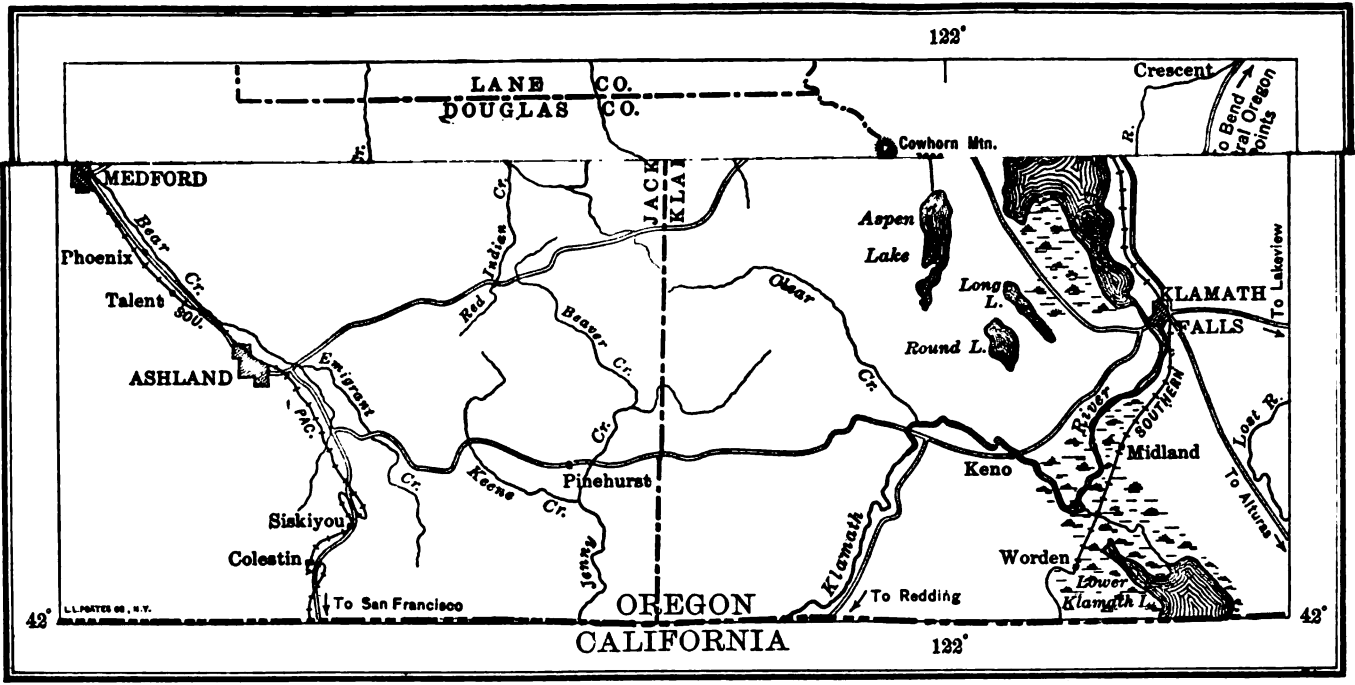
THE NEW TRAILS.

The splendid new trail from Crater Lake Lodge to the shore of the lake, one of the important improvements of last year, has given pleasure and refreshment to thousands, and, as we expected, elderly people and visitors wholly unaccustomed to climbing availed themselves of the opportunity to make the delightful trip from the lodge to the edge of the lake, thence in motor boats around the lake to Wizard Island and the Phantom Ship, and to other points of interest. The new trails to Garfield Peak and the Watchman were also exceedingly popular during the past season. A trail to the summit of Union Peak is now under construction and will be finished before the park is closed for the winter.

Wild animals are taking refuge in the park in greater numbers, thus adding to the attractiveness of the place for national park visitors who generally expect to see animals and birds flourishing in all of the parks. The park, however, is too small to become a satisfactory game refuge and propagating ground, and it will always be necessary to have State game preserves established around part or all of the park in order that winter range may be provided for the animals when heavy snows drive them down from the higher altitudes.

THE GREATER CRATER LAKE.

The project which contemplates the extension of Crater Lake National Park northward to include Diamond Lake, Mount Thielsen, and other scenic features of really national importance, has been shaped definitely during the past year, and Senator McNary, of Oregon, on April 6, 1918, introduced Senate bill 4283, which provides for the transfer of a tract embracing 92,800 acres to the control of the National Park Service as a part of Crater Lake National Park. When the park has been enlarged as proposed by this measure an opportunity will be afforded for developing to a very much greater extent the camping facilities of this region. Diamond Lake will lend itself to development as a fishing resort of great importance and other recreational features will be added that will, in a few years,



MAP SHOWING THE PROPOSED ENLARGEMENT OF THE CRATER LAKE NATIONAL PARK.

make this park as great a resort as most of the very big national parks. This is its manifest destiny. Furthermore, the enlargement of the park will make conditions more satisfactory from the point of view of the development of first-class transportation, hotel, and camp accommodations, because the traveling public can be induced to spend more time in the park than ordinarily is the case at the present time. More roads will be built, opening up unusually interesting territory, and providing circle trips that will delight the traveler. A road connecting Crater and Diamond Lakes would be a natural development. The addition will also afford better opportunities to protect the wild life of the park.

Like the proposed extension of the Yellowstone National Park, the addition of the Diamond Lake region to Crater Lake would give to the national park system something that was intended by nature always to be the property of the Nation and to be developed as a recreational area for all the people. I feel that this extension proposition is one that should receive the early consideration of Congress. The earlier the pending bill is enacted into law the sooner, of course, we can begin plans for the development of the enlarged park after the close of the war.

ROCKY MOUNTAIN NATIONAL PARK.

Rocky Mountain National Park has again reported a very satisfactory season from the standpoint of travel, the total number of its visitors exceeding 100,000. In view of this showing, we may reasonably assume that in all seasons to follow six figures will be required in writing the total number of visitors to this park.

The popularity which Rocky Mountain Park enjoys is very gratifying to me, particularly because it has won this on its own merit as a magnificent scenic region, easily accessible from the Middle West, as well as from the Rocky Mountain country and the Pacific coast.

A HUNDRED THOUSAND VISITORS BUT NO IMPROVEMENTS.

However, it is a matter of deep regret to me that the National Park Service has not been able to proceed with the development of this park. The annual appropriation of $10,000 is so small that we are not even able adequately to protect its great area of 400 square miles. Improvement of the park is impossible, and there is no money available for maintaining the improvements that have been made in the past with other than Federal funds. The trail system is incomplete, the telephone system is hardly begun, there are insufficient quarters for the park force, there is only one public camp ground, and so I might go on enumerating these deficiencies indefinitely. We need large sums of money to properly advance the interests of this park, and I earnestly hope that these funds will soon be forthcoming. We could calmly accept a situation of this kind if the park were being visited by only a few hundred residents of Colorado, but when people are going there by tens of thousands from all over the Nation and finding this wonderful region the object of neglect by the Federal Government, we feel that something should be done to relieve the unhappy situation.

There is a bill in Congress providing for the repeal of that part of the organic act establishing the park which limits the appropriation for the reservation to $10,000 per annum, unless larger sums are first especially authorized by law. This bill has passed the Senate and is now pending on the floor of the House of Representatives. The history of the measure will be found on page 899.[1] A similar bill passed the Senate in the Sixty-fourth Congress.

I am confident that the pending legislation will become a law during the short session that begins in December. It is inconceivable that it should be allowed to die with the Congress, thus requiring the expenditure of new effort next year in again obtaining consideration of the bill in the Senate. It has been nearly four years since the park was created.[2] In that time it has become widely known throughout the United States; it is used by more people than the combined visitors of many other national parks, and it is bound to become more popular with each succeeding season. The time has come for its improvement on a large scale.

STATE'S PROGRESS ON THE FALL RIVER ROAD.

The Fall River Road, which has been under construction by the State of Colorado for several years, is still unfinished. It is idle to conjecture when it will be completed, although it appears that the east and west ends of the highway could be joined in a few months next year if the shortest and most desirable route should be chosen. I have just received a report from the assistant director, who has been in Rocky Mountain Park studying some of its problems. In this statement he insists that the Fall River Road should be continued from the head of the Fall River to the top of the mountains, thence across the relatively flat summit to the Continental Divide near the Poudre Lakes. A contractor has offered to perform this work for $10,000 per mile, and complete the highway before September 1, 1919. The distance is approximately 6 miles. This is a very fine scenic route and is, according to all accounts, the best route from every other standpoint. The alternate route, and the one selected by the State, follows Chapin Creek down a wooded valley to its junction with the Cache la Poudre River, thence it follows this larger stream through its wooded valley to Poudre Lakes. This route is longer than the other, it has no scenic qualities worthy of mention, it will cost more to build the road on this survey, and it will be very expensive to maintain after it is constructed. We shall continue our policy of not interfering with the work on the Fall River Road, but we feel that we have reached a stage where we must require the State of Colorado to build a road that will obviously benefit both the State and the Nation in the greatest degree, rather than a highway that will be unsatisfactory to both.

Work on the Fall River Road progressed faster this year than usual. On the west side of the park the new road was brought nearly to Poudre Lakes. On that side we have a broad, well-constructed road, with all brush and fallen timber disposed of, while on the east side of the range the road is generally narrow, has few turnouts, sharp turns are numerous, and there is an unsightly litter of brush and down timber along the right of way. The best section of the road on the east side was finished this year by the Rocky Mountain Parks Transportation Co. It is nearly 2 miles in length, and is wide and well graded. The end of the road is now a short distance beyond the old shelter cabin and is at the point where it begins to climb out of the canyon toward the pass at the head of Chapin Creek.

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[1] See also the report of the House Committee on the Public Lands, p. 1044.

[2] Rocky Mountain National Park was established by the act of Jan. 26, 1915 (38 Stat., 798).

MAGNIFICENT CIRCLE TRIPS IN PROSPECT.

When the Fall River Road is completed a magnificent circle trip will be immediately available to all visitors to Rocky Mountain National Park. This may be made in either direction from Denver, and will provide two crossings of the Continental Divide, one in Rocky Mountain Park and the other through Berthoud Pass, slightly northwest of Denver. Besides the magnificent scenery of the park itself, the famous Grand Lake district and the interesting old mining regions in the watershed of Clear Creek will be features of the trip. When one considers the fact that the splendid road system of Denver's Mountain Parks may also be considered a part of this ride, it is difficult to conceive a more thrilling or beautiful trip than the one that would be provided by the completion of this Fall River Road.

The important thing to do now is to complete as quickly as possible the few remaining miles of this road, and to accomplish this work by following the most satisfactory route. Longer delay in this work will not only impair the development of Rocky Mountain National Park, but it will interfere with the proper and logical development of Colorado's roads as a great national touring highway system.

The State of Colorado has continued during the year the construction of its new road along the Cache la Poudre River north of the park, and 30 miles of the highway out of Fort Collins are now completed. It is proposed to vigorously prosecute the continuance of this work and bring the road as soon as possible into the northwest section of Rocky Mountain Park. From the standpoint of the development of the park this road should be joined to the Fall River Road on the Divide at the head of Chapin Creek. This would make possible the circle trip through the park between Estes Park and Fort Collins. The Fall River Road should be completed long before the highway of the Cache la Poudre, but it is not too early to plan the use and development of the two highways after they shall have been connected.

NO CONNECTION BETWEEN FALL RIVER ROAD AND GENERAL APPROPRIATIONS.

I would emphasize again the necessity for keeping the Fall River Road project and the legislation regarding the removal of the inhibition on the annual appropriations of Rocky Mountain Park entirely distinct. They have no relation to each other. The State of Colorado promised to build the Fall River Road, and this obligation it has not yet fulfilled. The obligation of the Federal Government to begin other development work is entirely different. The fulfillment of the State's obligation can not under any circumstances be regarded as a condition precedent to Federal action. The existin road system must be greatly improved; new trails must be constructed; shelter cabins and ranger stations are urgently needed; and the patrolling ranger force must be augmented. There are many other things, too, that must be done in the early future if the multitude of visitors who come to the park each year is to fully enjoy its mountains, forests, lakes, and streams.

Lack of funds has prevented the employment of traffic officers on the roads of the park, but the Tourist Bureau of the Denver Civic Association has very generously provided funds to defray the cost of obtaining accurate travel statistics at the Estes Park and Longs Peak gateways. This efficient and public-spirited bureau has in many other directions aided the National Park Service in advancing the interests of Rocky Mountain Park.

PATROLLED BY PATRIOTIC CITIZENS.

Under the Colorado law, hunting was permitted in the State during the first four days of October. During this period it was necessary to secure voluntary assistance in protecting Rocky Mountain Park, as unfortunately certain people residing in or near the park declared their intention of hunting both on private and public lands within the park boundaries. They were prevented from doing this, however. The ranger force was augmented by the appointment of citizens of Estes Park and loyal friends of the national park residing within its boundaries, and they carefully patrolled the territory until the need for their services had passed.

THE SECOND WINTER CARNIVAL.

In February, 1918, another winter sports carnival was held in the park. The attendance was smaller than last year, due to the fact that war had called many members of the mountaineering organizations. However, the carnival was a great success, and arrangements are now being made for the next one, which will be held early next year. The use of Rocky Mountain Park in the winter is one that the National Park Service will continue to promote. The automobile stages of the Rocky Mountain Parks Transportation Co. are operated throughout the winter, thus providing comfortable facilities for reaching the park whenever conditions are right for the sports that only snow and ice can make possible.

WANTED: CAMPING GROUNDS FOR MOTORISTS.

One of the problems to be faced in developing Rocky Mountain National Park is the establishment of adequate camping grounds for motorists. So much of the land in the western part of the park is privately owned that there is little opportunity to lay out satisfactory camping sites. Of course, when the money is provided for the construction of more roads, particularly for the building of short branch highways to reach public lands, no difficulty will be experienced in providing camping grounds. In the meantime, however, it is our view that the residents in the national park should arrange to open to the use of motorists small tracts of unused land where this can be done without impairing their property. The private lands opened for this purpose might be placed under the jurisdiction of the superintendent of the park, who would assume the responsibility for the upkeep of the grounds and the observance of the rights of their owners.

During the year the Glacier Basin camp ground was improved and in the tourist season was used by hundreds of visitors. The new road to this area was constructed largely by means of private subscription. Considerable work was done by citizens of the park region and our own administrative force.

TRAIL TO LAKE NANITA.

The opening of the beautiful Lake Nanita to tourist travel was probably the principal improvement accomplished by the National Park Service in Rocky Mountain Park during the summer. This lake is one of the loveliest bodies of water in the park, and also furnishes good sport for the angler. There were insufficient funds available to continue this trail to Lake Nokoni, but this sister lake will be made accessible as soon as a few hundred dollars can be spared to undertake this work.

GLACIER NATIONAL PARK.

Conditions were ideal for tourist travel in Glacier National Park this year, but visitors were few as compared with the number usually availing themselves of its splendid accommodations. Steadfast in their devotion to the interests of this beautiful park, the concessioners operated their enterprises throughout the season in the face of the certain loss due to decreased travel. All the big hotels and most of the chalets were open as usual except the Sperry Chalet on the Gunsight Pass Trail. The loss to the system of Sperry Chalet made the trip over the Pass somewhat more difficult, but in no other manner affected the use of the park trails, as other points of interest in the vicinity of this chalet were easily accessible from the Glacier Hotel on Lake McDonald.

Train service to the park was entirely adequate, although trains Nos. 3 and 4, the Glacier Park Limited, were not operated this year.

The Glacier Park tourist season was shortened this year from four months to three, the opening date being June 15 and the closing date September 15.

The decrease in travel was due to the same conditions that similarly affected Yellowstone National Park, the withdrawal of railroad advertising and governmental discouragement of travel for pleasure. Glacier, like Yellowstone, is still dependent to a great extent on the railroads and publicity bureaus to stimulate travel by automobile as well as by train. Like Yellowstone and other Rocky Mountain parks it is situated at a very considerable distance from thickly-settled regions, and enjoys relatively little local travel.

GLACIER'S SUMMER RESIDENTS.

Unlike Yellowstone, Glacier already has a large patronage which comes again and again to explore its trails and enjoy its extraordinary scenery and good hotels. As its roads and trails are extended, and more side trips provided from hotels and chalets, the average stay will be still further lengthened. It is my ambition to improve conditions to this end as rapidly as possible.

Motorists were more numerous in the park this year than formerly, and there was a noticeable increase in travel from Canada. A large part of both American and Canadian motor travel, however, originated in territory not far distant from the park, and hence may be considered local.

There was some travel by motor between Yellowstone and Glacier Parks, but probably less than usual. It was divided between the Yellowstone-Glacier Bee Line Highway by way of Great Falls, the Helena route, and the route by way of Flathead Lake—all routes of the National Parks Highway. As I have mentioned elsewhere, this association, which has been promoting the development of the Yellowstone-Glacier Bee Line Highway, has accomplished many important improvements this year. A meeting of the association was held in Chouteau, Mont., in August.

ROAD TO CONNECT THE ENTRANCES.

The State of Montana, the counties embracing Glacier Park, and others situated near them have made arrangements to construct an automobile road paralleling the Great Northern Railway and the south boundary of the park. It is understood that the assistance of the United States through the agency of the Federal aid roads act is expected in bringing this project to successful completion. This road will connect the east and west gateways of Glacier National Park, but it will not be a scenic highway nor will it relieve the National Government from the necessity of building another highway over one of the great passes of the park itself.

The railroad crosses the Continental Divide through a low pass, which may be kept open in winter by the use of snow-removing machinery. The proposed road to parallel the railroad may be kept open most of the year, but there will be a few months during the winter when it will be impossible to use it. None of the magnificent scenery of Glacier Park may be seen from this route. Much of the timber in this region has been destroyed, and there are still some ugly fire scars to be observed. The road will be of advantage to the park, however, and it will stimulate motoring to this region, but it will be chiefly a commercial highway.

SURVEY FOR A TRANSMOUNTAIN ROAD WITHIN THE PARK.

A survey for a transmountain road, within the park itself is now being made by the engineers of the National Park Service under an allotment from the current appropriation. Several routes are going to be investigated, but only one road will be recommended for construction. In requesting Congress to appropriate funds to conduct these surveys, it was our object to develop a road construction project, with full and accurate estimates to lay before the appropriations committees at the close of the war. If adopted by Congress, the project, according to the usual practice, would receive annual appropriations in such amounts as could reasonably and economically be expended in the working season. It would, of course, require several years to complete a road of this character.

It must begin on the west side of the park and connect the foot of Lake McDonald with the Glacier Hotel at the head of the lake. Then, on the east side of the mountains, Going-to-the-Sun Chalet must be connected with the road between Glacier Park and Lake McDermott. The last section of the highway to be built will cross the Continental Divide and form the connecting link between the road systems of the two sides of the park.

Another and wholly distinct unit of the project now being formulated will embrace the extension of the Cutbank Road to the head of the Cutbank Valley, where a new chalet will be constructed. This unit should be built as soon as possible after the close of the war, and really should be carried forward to completion with the Lake McDonald road on the opposite side of the park.

THE LAKE McDONALD HIGHWAY.

In previous reports I have emphasized the vital importance of the highway connecting the hotel at the head of Lake McDonald with the roads at its foot. Each year the necessity for this improvement becomes more apparent. Motorists find no accommodations at the foot of Lake McDonald for their cars, and they naturally dislike to leave them here when they go to the head of the lake, some 9 miles distant. Consequently, they are discouraged from making trips to the west side of the park. It is particularly disheartening to the motorist who sends his car over the mountains by rail to find so few miles of road on which it can be used, and at the end of this road no place in which to house the machine while he proceeds by boat to the hotel.

But, aside from these considerations, the road along Lake McDonald would greatly reduce the cost of operating the hotel and would make the maintenance of trail crews in the mountains easier and cheaper. Furthermore, this road would form a link with a highway north and south through the park from Belton to Waterton Lake as well as an important section of the transmountain highway now being surveyed.

Some progress has been made in the improvement of the existing roads of the park during the current year, but it can not be said that this progress is comparable with last year's accomplishments. In the first place, no new construction was authorized, and the funds available were necessarily applied to the protection and maintenance of the park, except the allotment reserved for the survey of the road to cross the mountains. In the second place, it was impossible to do ordinary maintenance work under normal conditions on account of the great scarcity of labor.

IMPORTANT ROAD IMPROVEMENTS.

There are still many necessary improvements to be made in the existing roads on the east side of the park as well as on the west side road up the North Fork of the Flathead. This has to be largely rebuilt when funds are available for this purpose. The east side system requires considerably more graveling and grading, and in the interest of safety to traffic these improvements should be carried on continuously until completed. They can not be deferred even during the war period without seriously retrograding.

THE CROSSING OF LOGAN PASS.

An important event of the summer was the opening of the trail over Logan Pass, connecting the Granite Park Chalet and the Going-to-the-Sun Chalets, and also making Going-to-the-Sun accessible from the Lake McDonald region by a route alternative to the Gunsight Pass Trail. The trail was begun last year, and completed about August 1, 1918. The Director General of Railroads and Mrs. McAdoo headed the first party to go through Logan Pass over the new trail.

This improvement opens a magnificent region to the touring public. Among its principal scenic features are the Garden Wall, the thin, sheer cliff of the Continental Divide between Swiftcurrent Pass and Logan Pass, Mount Oberlin, Clements Mountain, the Clements Glacier, the superb Hanging Gardens—a veritable paradise of wild flowers—Mount Reynolds, the falls of Reynolds Creek, new and amazing views of Going-to-the-Sun Mountain, and the peaks and lakes of the St. Mary region. A short side trip from the Hanging Gardens reveals one of Glacier Park's rarest gems—Hidden Lake.

The Park Saddle Horse Co. began at once encouraging the use of this new trail by offering a three day "triangle trip" between Many Glacier Hotel, Granite Park Chalet, and Going-to-the-Sun Chalets, at the rate of $12.50 including guide. This trip covers three of the best trails of the park, and takes the tourist over three of the great passes—Swiftcurrent, Logan, and Piegan. In the course of the trip the Continental Divide is crossed twice.

IMPORTANT NEW TRAILS CONSTRUCTED AND PROJECTED.

Another new trail that has proven to be very attractive to the traveler is that to the Sexton Glacier; it opens up the canyon of Baring Creek, a marvelous series of waterfalls and the unique overhanging glacier. It was completed last year, and is reached from Going-to-the-Sun Chalets. Ultimately it will be continued over the ridge above the Sexton Glacier, and thence through a flower carpeted vale to a junction with the Piegan Pass Trail.

The trails that are to be constructed next in this park will be a series of footpaths from the various hotels and chalets. These will afford short climbs to near-by mountains, easy walks along lake shores, and little strolls in the forests.

Immediately after the war at least three important new trails must be constructed in the high mountains. One of these trails will connect the Red Eagle country with Going-to-the-Sun Chalets. Another will make the Kintla Lake region accessible by way of Brown Pass, eliminating the long journey by way of Waterton Lake and Canada that now is necessary. The third will make the Hole-in-the-Wall Falls accessible.

Still another trail that should be built soon will open up a scenic route to the Belly River district from Many Glacier Hotel, thus avoiding the long circuitous route by way of the Indian Reservation and Chief Mountain which is now the only means of reaching this region.

SERIOUS IRRIGATION PROBLEMS.

There are two reclamation projects which have reservoir facilities in Glacier National Park. To the Milk River Project belongs the Sherburne Lake reservoir. The Lower Two Medicine Lake area belongs to the Indian irrigation system known as the Blackfeet Project. The engineering works of the latter reservoir were completed many years ago, but never used; the Sherburne Dam and other works of the former project are now nearing completion.

In the early future the gates of these dams will be closed, the Sherburne and Lower Two Medicine Lakes will be raised, and hundreds of acres of timberland will be flooded. The destruction of all timber within the flowage areas can not be avoided, and the bleached skeletons of dead trees standing on the lakes or floating upon them will impair the scenic beauty of two of Glacier Park's most celebrated valleys for decades to come. It is extremely important that all of the timber and bush within the areas that are to be flooded should be cut down and destroyed before this is made impossible by the raising of the lakes. In view of the fact that the reservoir sites were secured before the establishment of the park, the cost of this work should undoubtedly be borne by the Federal Government rather than by the water users on the reclamation projects involved.

The impossibility of securing funds for undertaking anything of this kind in these times may postpone action until it becomes too late to remedy the situation. If this proves the case, the injury to Glacier Park will, in a few years, become a national calamity. The impounded water in Sherburne Lake will extend the western shore almost to the foot of Swiftcurrent Falls, and in the case of Lower Two Medicine Lake, the new shore line will not be far from the bridge over the Two Medicine River below Trick Falls.

Before Lower Two Medicine Lake is raised it will also be necessary to rebuild a section of the road that leads up the Two Medicine Valley to the chalet system on Upper Two Medicine Lake. The road now leaves the main highway and crosses the river twice before attaining the high ground on the north side of the lower lake. One crossing is at the outlet of the lake and above the dam. This bridge and part of the road would be inundated by the raising of the lake, hence a new road some four miles in length must be built entirely north of the river, avoiding any crossings after leaving the main road system. An estimate for funds to build this branch road will be submitted as soon as the existing emergency has passed, and labor can be obtained for construction work of this character.

FISH HATCHERY ESTABLISHED.

From the standpoint of the future of Glacier Park, the most notable achievement of the past year has been the establishment of a fish hatchery at Glacier Park Station. This hatchery was built and equipped under a cooperative arrangement between the Bureau of Fisheries and the National Park Service. The building was erected on a tract of land near the Glacier Park Hotel, and will be open to visitors throughout the tourist season. As in Yellowstone Park, the Bureau of Fisheries will give special attention to the educational features of its work in Glacier National Park.

The land upon which the hatchery has been constructed was generously donated to the Government by the Glacier Park Hotel Company and accepted by you under special authority granted by the sundry civil act of June 12, 1917.[1].

Another tract of land near the railroad was also granted to the Government by the hotel company for use as an administrative site. A warehouse, garage, and ranger station will be constructed on this property. The gift of these valuable pieces of property by this corporation indicates eloquently the spirit of cooperation and helpfulness that marks its dealings with this department.

NEW ADMINISTRATION BUILDINGS AT BELTON.

The improvement of the new administrative site near Belton, on the west side of the park, where the general headquarters of the reservation are located, has progressed satisfactorily. The cottages, warehouse, barn and water system begun last autumn have been practically completed and will soon be used by the administrative force. Nothing more will be done at this point until after the war. In the meantime the new administration building will be planned and the landscape treatment of the site carefully worked out. There is an opportunity here to develop a very attractive administrative village, and it will be utilized to the full.

In previous reports we have pointed out the fact that the forest along the Belton-Lake McDonald Road is in grave danger of destruction. It is privately owned, and although Congress has authorized the exchange of this timber and land for timber of equal value in other parts of the park, or in the national forests of Montana,[2] no agreement has yet been reached as to the value of this property. A small area of timber along this road has already been cut over, and the havoc wrought here shows what a terrible fate awaits the entire highway between the administrative site on the river and the foot of Lake McDonald if the exchange negotiations should finally fail to accomplish their purpose.

Boating is coming to be one of the important sports of Glacier Park. With the development of the related sport of fishing, the demand for all types of boats will steadily increase. One of the lakes that is best adapted for boating and fishing because of the splendid hotel accommodations on its shore is Lake McDermott in the Swiftcurrent Valley. It is so small, however, that it seems advisable to better connect it with Lake Josephine by installing a dam to enlarge the watercourse between the two lakes.

This work was to have been performed last year, but lack of funds prevented its accomplishment. In all likelihood the project can be carried on next season.

As I have explained in another part of this report, the wild animals of the park are in good condition. A great increase of predatory animals has been noted, and steps are being taken, in cooperation with the Biological Survey, to cope with this menace. The matter of establishing the nucleus of a herd of buffalo in the park is being considered a post-war undertaking. There are several areas that may be used for a buffalo ranch, and, with the expenditure of a relatively small amount of money, it would appear to be feasible to maintain such an enterprise.

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[1] See p. 882 for text of authority. Also see First Annual Report of the National Park Service.

[2] Act of Mar. 8, 1917 (39 Stat., 1122). See First Annual Report of the National Park Service, pp. 48 and 225.

MESA VERDE NATIONAL PARK.

The past year has been an epoch maker in the history of Mesa Verde National Park. It has always ranked among the most important parks of the national system, but it has now taken its place as one of the best improved reservations under the control of this bureau. It boasts now of almost every accommodation that any park offers to the traveling public except a hotel. It has a well-equipped permanent-camp, excellent transportation facilities from the town of Mancos, well improved roads, and some very fine trails.

An automobile shelter and public camp ground have been made available during the year.

The permanent camp across the canyon from Spruce Tree House has been enlarged and attractively rearranged. The tents have been equipped with more new furniture, and electric lights have been installed. The plant is now a modern camp enterprise, capable of furnishing service of a high order.

A MUSEUM ESTABLISHED.

A new ranger station has been erected near Spruce Tree Camp, and the large log structure with the broad veranda overlooking the canyon and the great ruin, which formerly was used as headquarters for the ranger force has been converted into a museum and picture gallery. Glass display cases have been installed to preserve and exhibit relics found in the ruins of the Mesa Verde. These will be augmented by others as the collection of relics grows.

Through the generous cooperation of the Denver & Rio Grande Railroad, a remarkable series of pictures of the natural features of the park and its ruins has been placed in the large room of the museum building. This room will be used as a public gathering place, and when archeological investigations are again undertaken there will be lectures here by the scientists in charge of the work of excavating and repairing the ancient buildings of the park.

No excavating has been done in Mesa Verde National Park since the summer of 1916 when Dr. J. Walter Fewkes, the Chief of the Bureau of Ethnology, opened and cleared Far View House in the Mummy Lake group of mounds. No funds have been available for the continuation of these investigations. It is unfortunate that an appropriation can not be made each year for the advancement of this great scientific work.

EXCAVATIONS SHOULD BE CONTINUED.

Much can be accomplished with relatively small appropriations, and I can not recommend too strongly the adoption of a policy at the close of the war which will contemplate the placing of a reasonable sum of money at our disposal each year for the purpose of conducting this highly important and valuable work.

While no new work on the ruins has been undertaken, repairs have been made to several of the large cliff dwellings, including the reinforcement of the foundation of one of the big towers in the Cliff Palace.

The most essential improvement still to be undertaken on the Mesa Verde is the repair and excavation of Square Tower (Peabody) House. This is one of the finest of the cliff dwellings, and is distinguished by a great four-story square tower. There are numerous interesting kivas in the ruin, several of them still covered with their original roofs of cedar poles. Above the ruin in niches of the cliff and on protruding ledges are some remarkable little structures that were probably built as part of the defenses of the big cliff dwelling. While quite inaccessible, and purposely kept so by the National Park Service, visitors will approach it by a perilous descent over the cliffs, and in the course of a season it is examined by a considerable number of people.

The great danger that threatens the ruin, as well as all who visit it, is to be found in the unstable condition of the square tower. It is deteriorating with considerable rapidity. Should it fall, the cliff dwelling would be largely destroyed and it would, of course, lose forever its most distinctive feature. The restoration of Square Tower House is, therefore, a project that requires immediate consideration. It is estimated that $3,000 will be sufficient to put the ruin in a state of repair comparable with Cliff Palace, Spruce Tree House, and the other large cliff dwellings that have already been excavated. In every respect, this ruin is worthy of preservation and development, and it would be a most lamentable thing to neglect it longer.

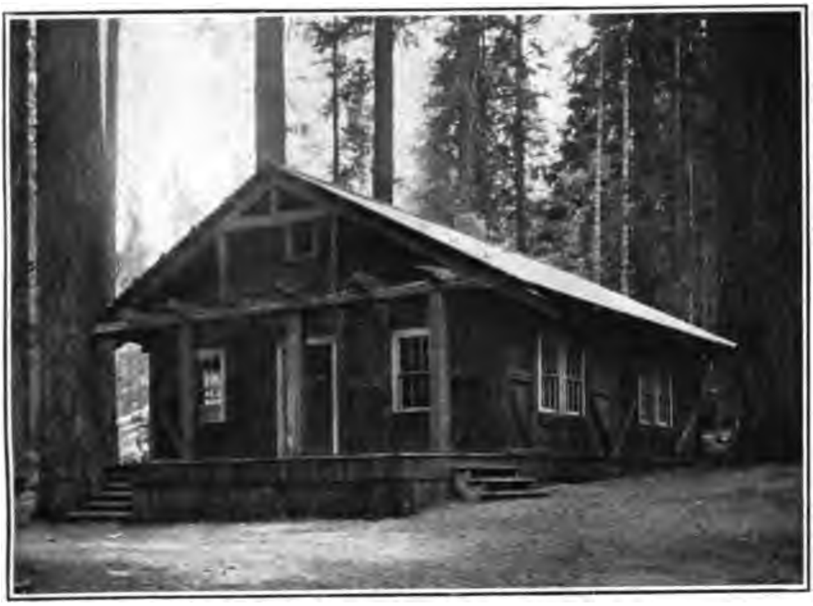
THE NEW EAST SIDE ROAD.

The new road to ascend the Mesa Verde from the east side of Point Lookout, recommended in last year's report as a vitally necessary improvement, was authorized by Congress in the latest sundry civil act, and construction work is now in progress. When completed, the highway now in use which climbs to the top of the mesa on a steep grade along the western face of Point Lookout, will be abandoned. This road is subject to the peril of sliding dirt and rock in wet weather, and is exceedingly costly to maintain. The new road will possess none of these disadvantages. Other new improvements undertaken which I have not already mentioned include the installation of a Delco electric-lighting plant at Spruce Tree Camp, the extension and betterment of the water system, the erection of an ice house, and the posting of a large number of new signs.

Travel to Mesa Verde Park this year compares very favorably with that of 1917. Two thousand and fifty-eight visitors registered in the park during the season as against 2,223 last year. Most of the travel was by automobile.

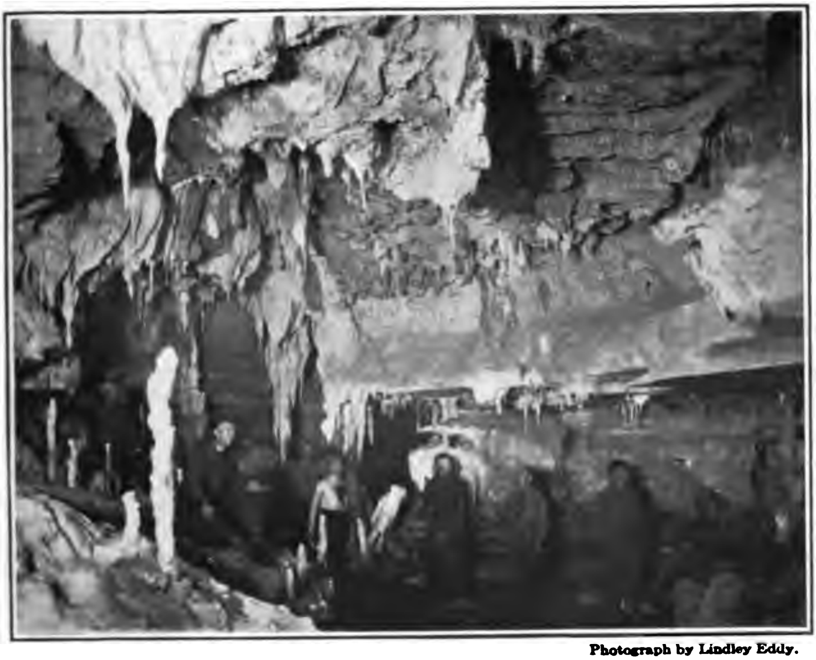
HOVENWEEP AS A NEAR-BY ATTRACTION.

In connection with this discussion of the year's activities in Mesa Verde Park, it is proper to mention the study of the towers and



A. NEW STOREHOUSE BUILDING, GIANT FOREST.

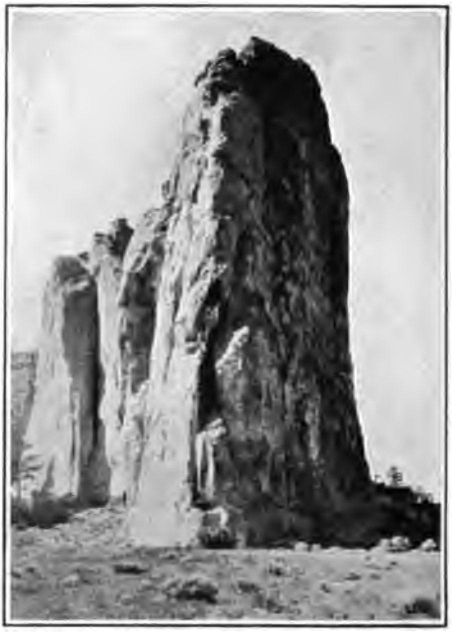
Type of administration building adopted for this park.



Photograph by Lindley Eddy.

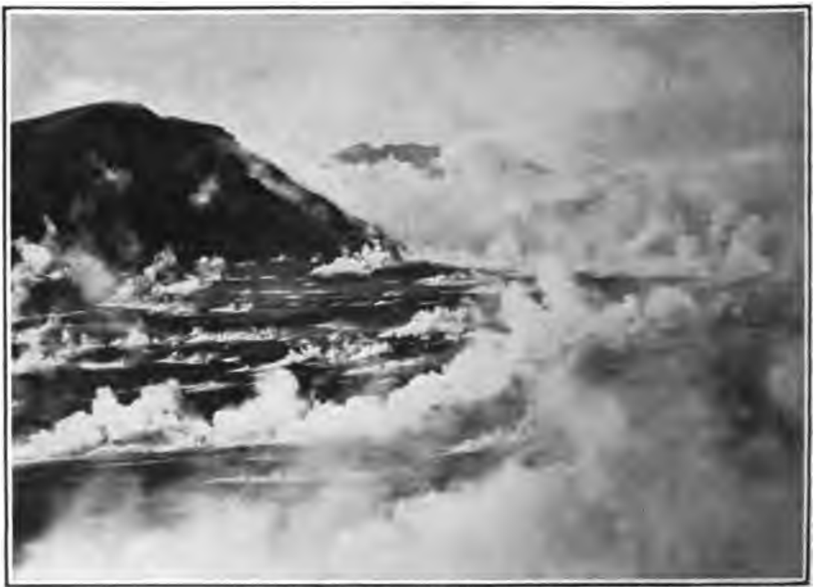
B. MAIN GALLERY OF THE RECENTLY DISCOVERED CRYSTAL CAVE.

SEQUOIA NATIONAL PARK.



INSCRIPTION ROCK, NEW MEXICO.

EL MORRO NATIONAL MONUMENT.



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VALLEY OF TEN THOUSAND SMOKES, ALASKA.

KATMAI NATIONAL MONUMENT.

other structures of the Hovenweep region near the road between Dolores, Colo., and Bluff, Colo., which Dr. Fewkes made late last year.[1] These ruins are among the most important in the Southwest, and because of their proximity to well traveled roads, they offer a very interesting trip for all Mesa Verde visitors to take either on their way to the park, or, preferably, after they have seen the cliff dwellings and other ruins of the mesa. The trip may be made in one direction by way of Dolores and Yellowjacket Canyon, and return by McElmo Canyon to Cortez.

Dr. Fewkes made a thorough study of these ruins, and has recently presented to the world their features and scientific worth in a series of reports and articles written in his usual clear and entertaining style. He states that there are several types of towers in the Hovenweep country. Some are round, others square, and still others have more than four sides. They are all very large and most of them stand out boldly on the plain. Near them, in several instances, are other prehistoric structures of great scientific importance including some remarkable kivas similar in size and construction to those of Far View House in the Park. From his study of these kivas and other works, Dr. Fewkes concludes that the inhabitants of this region and the Mesa Verde were racially similar. It is proposed to safeguard all of these ancient buildings by including them in a national monument.[2]

HAWAII NATIONAL PARK.

Substantial progress was made during the past year in reaching a solution of the problem that is immediately confronting us in preparing for the development of Hawaii National Park. This problem relates to the acquisition of private holdings in the three park areas, and the right of way necessary to constitute the fourth area or connecting strip of land between the crater of Mokuaweoweo on the summit of Mauna Loa and the Kilauea park far below it. All the private holdings in the Mokuaweoweo section were donated to the Federal Government since the date of the last report. These were secured by officials of the Territory acting in behalf of the National Park Service. The donors of the property were the Territorial government, the Bishop estate trustees, and A. W. Carter, trustee of the Parker estate.

On the occasion of your trip to Hawaii in the month of June, 1918, you conducted negotiations with the trustees of the Bishop estate, which owns a large part of the Kilauea park tract, including approximately half of the famous crater of Halemaumau, and other very important features of this region, with a view to securing title to these important lands. The results of these negotiations were most gratifying, and it is believed that the principles suggested to govern the transfer of part or all of this property to the United States may ultimately be used to clear up all private holdings in the Kilauea and Haleakala tracts. Briefly, an exchange was proposed whereby the Bishop estate is to convey all of its holdings in and about the crater of Halemaumau to the Government in return for Territorial land of equal value.[1] As soon as the exchange can be arranged, Congress will be requested for a grant of authority to consummate the various transactions involved.

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[1] See 1918 Circular of Information Regarding Mesa Verde National Park.
[2] See pp. 839 and 901.

In the organic act establishing this national park, it is provided that appropriations for its development may not be made until Congress is advised that private holdings and rights of way necessary for the proper protection and improvement of the reservation have been acquired by the United States. In view of this inhibition, it is essential that this property should be acquired at the earliest practicable date. To aid in this work, an appropriation of $750 was included in the last sundry civil act, and a request is now being presented for an appropriation of $1,000 to continue the work in the fiscal year ending June 30, 1920. These funds will cover cost of examining titles to lands, surveying, traveling, and communication expenses, etc.

HAWAII'S GREAT INTEREST IN HER NATIONAL PARK.

The Hawaii National Park has the greatest interest for visitors touring this charming island territory, but no individual or institution gives more attention to these wonderful volcanic areas than the citizens of Hawaii themselves. All of the prominent business and professional men and officials of the Territory are intimately acquainted with the park lands. Many of them are members of organizations that have promoted these areas for years, spending money freely in making them accessible and in stimulating travel to them. Furthermore, they have contributed liberally to institutions, such as the Hawaiian Volcano Research Association, which have proved valuable to science by investigating the phenomena of volcanism.

It was the Hawaiian Volcano Research Association that took the lead in urging upon Congress the necessity for conserving the three great craters of the islands in a national park in order to adequately protect and develop them for the American people. The president of the association, Mr. L. A. Thurston, of Honolulu, spent some time in the Eastern States early in the present year, and on several occasions I was able to consult with him in regard to the future improvement of the park. Other citizens of Hawaii who have visited Washington since its creation and left valuable hints and suggestions about its development are Gov. Charles J. McCarthy, Mr. B. G. Rivenburgh, commissioner of public lands of the Territory, and Mr. W. R. Castle.

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[1] Excerpt from speech made by Secretary Lane at inauguration of Gov. Charles J. McCarthy, of Hawaii, June 22, 1918:

"Congress has taken an increasing interest in these later years in the preservation to the people of the places of beauty and grandeur, and two years ago extended this policy to the Hawaiian Islands by the creation of a national park, partly upon the Island of Hawaii and partly on the Island of Maui. To this park it gave whatever public land it had control over. That feature in this park which is of crowning interest—and I may safely say, I think, that it is the most suggestive of all natural wonders, because it illustrates one method of the world's making—is the Volcano of Kilauea. Through the middle of its lake of lava runs the Bishop estate line. And for purposes of property policing this park, and more surely reserving it for the public, I have taken up with the trustees of this estate the matter of securing a transfer to the Government of all the lands which they own in and around this crater. The suggestion made by us has met with prompt and very agreeable response. The estate feels itself unwarranted in transferring the property without consideration, because all of its property is held in trust for eleemosynary purposes. But the trustees will consent to the transfer in exchange for other property of equal value out of the Territorial public lands. Warrant should be had for this from the Federal Government and the Territory, and with honest appraisers there should be little difficulty in securing the full title to all the lands within the park boundaries. I am sure that the Federal Government will cooperate with the Territory in putting beyond all question the future of this park."

UNIQUE AMONG NATIONAL PARKS.

The Hawaii National Park is important in much more than the ordinary way. Its three volcanoes are individually and collectively remarkable in a world sense. Mauna Loa is largest in the world, both as an active volcano and as a mountain mass. Haleakala's crater is unequaled in size among active volcanoes. "At sunrise," writes T. A. Jagger, director of the observatory, "it is the grandest volcanic spectacle on earth." And Kilauea's crater, its bubbling seething lake of molten lava, its "house of everlasting fire," has been world celebrated for many years.

These features alone would class Hawaii in the first rank of national parks. In addition, its location on an island group widely famous for tropical beauty, and the fact that a visit to it involves also a romantic invasion of the tropical seas in their most fascinating expression, put it in a class altogether by itself; its entrance into the park system completes the gamut, so to speak, of the national park range from the arctic, as expressed in ice-clad McKinley, to the equatorial here. Indirectly, the spectacle of the development of American genius in the tropics is another fascinating experience of any visit to the park.

Besides the rich luxuriance of tropical verdure found at and near Hawaiian sea levels, the park areas themselves exhibit gorgeous jungles, mahogany groves, tangles of giant tree ferns 30 and 40 feet high, and splendid growths of fragrant sandalwood, elsewhere extinct.

LASSEN VOLCANIC NATIONAL PARK.

Congress again failed to appropriate funds for the administration and protection of Lassen Volcanic National Park; hence we have not been in a position to do anything to further the interests of this reservation. No member of the National Park Service has visited the Lassen Peak region, nor have any publications been prepared describing its scenic features or giving information as to its accessibility and accommodations. Nevertheless there appears to have been considerable travel to the park both by saddle horse and automobile. Interesting accounts of trips by motorists, profusely illustrated, have appeared in the California newspapers.

An ambitious development of a private holding on the shores of the Juniper Lake has been undertaken by an Oakland, Cal., firm and it is probable that the opening of this new resort will result in an increase of travel to this wonderful region next year.

A new road has been opened from Chester, Plumas County, to the shore of Juniper Lake. The road is 13 miles long, and was constructed by the owners of the patented holdings on the lake. This road was made passable for travel this summer, but it is not in a condition to sustain heavy traffic. The grade does not exceed 10 per cent at any point despite the fact that it ascends 3,000 feet between Chester and Juniper Lake. This road, although constructed by private capital, is available for the use of all motorists without restrictions of any kind. The section of the road lying in the park was consructed under permit from the National Park Service.

I feel a keen sense of disappointment that Congress has not permitted us to assume control of this area which it clearly intended us to take over when the park was created. It would seem that no object was accomplished in creating this park if it were not to be administered as such. Furthermore, since this area is a park in name only we are constantly required to explain why it is not being managed as a part of the park system. The park has many wonderful objects of scientific interest and also offers extraordinary opportunities for fishing, camping, and enjoying scenery of a high order.

The fact that it is already attracting tourist travel makes it all the more necessary that funds be provided for its care and protection. There are large areas of magnificent forests that are subject to the fire hazard, and these should be diligently guarded. The wild animals of the region should also have proper protection. There is considerable hunting in the adjacent forests and, in view of the fact that the park boundary has not been surveyed or marked in any satisfactory manner, abundant opportunity is offered for unconscious trespass by zealous hunters. I sincerely recommend the early appropriation of sufficient funds to make possible the employment of a superintendent and the necessary assistants, as well as a small amount for general administrative purposes.

There have been no eruptions from Mount Lassen during the year, and the volcano has shown few signs of activity of any kind.

MOUNT McKINLEY NATIONAL PARK.

Owing to the fact that Congress again declined to provide funds for the administration and protection of the Mount McKinley National Park, we have not been able to assume control of this area; consequently there is little to report. Estimates have twice been submitted covering the funds necessary to establish a ranger force and give it proper quarters and equipment, but it appears that Congress believes the Alaskan government competent to care for the wild animals that abound in the park at the present time, despite the fact that the park was created as an emergency measure especially to prevent the slaughter of game which the authorities of the Territory were powerless to control at that time. Another estimate, in amount $10,000, is being submitted to Congress with a request for an appropriation for purely protective and administrative purposes, and it is sincerely hoped that it may receive favorable attention when the next sundry civil bill is prepared.

The Territory of Alaska is not financially able at the present time to provide wardens to adequately patrol the park area. Its game-protection funds are too small, and any wardens that are now assigned to the park must be taken from other sections of Alaska where they are badly needed.

A LITTLE TEMPORARY HELP FROM GOV. RIGGS.

However, Alaska realizes the importance of rendering all possible aid to the National Park Service under existing conditions, and will do everything possible to assist in the Mount McKinley region until this bureau secures an appropriation. The present governor of the Territory, Hon. Thomas Riggs, jr., while a member of the Alaskan Engineering Commission, was one of the men who participated in the presentation of the merits of the Mount McKinley Park project to the committees of Congress having it under consideration prior to its appearance in the House and the Senate. His interest in the region has always been keen, and, now that he is the executive head of the Territorial government, he is indicating the strength of his faith in the park and its potential economic value to Alaska and her people by doing everything that he can consistently do to protect the area pending the assumption of control by the National Park Service. I have mentioned his limits already. He has not funds enough to provide wardens to fully protect the wild animals, and just now these constitute the principal natural feature of the park and the one constantly in danger.

DANGER FROM MARKET HUNTERS.

Mount McKinley National Park ranks with Yellowstone as a wild-animal sanctuary. Within its boundaries roam enormous bands of caribou and mountain sheep, together with the other species of a region which the hunter has just begun to invade.

All of these must be safeguarded constantly. Each year increases the danger from market hunters, the near approach of the new Government railroad creating new and greater demand for meat. Naturally the hunter will go where the game is thriving best in order that he take the fullest advantage of his opportunity to serve good markets. There is bound to be a serious invasion of the park sooner or later, and I am anxious to establish a permanent force of guards at an early date in order that the great herds of this preserve may receive the protection that Congress intended in creating the park.

When this is accomplished we may not seriously concern ourselves with further development measures for this park until the Alaskan Railroad is completed and the time arrives for providing facilities for tourist travel to this wonderful region.

HOT SPRINGS RESERVATION.

The year just concluded was principally notable for the vision it brought us of the National Spa of the future. I refer to the plans prepared under the appropriation of 1917 for the larger development of Hot Springs, including landscape improvement and a new Government bathhouse. They were brought here by Mr. Geo. R. Mann, of Mann & Stern, architects, of Little Rock, Ark., and exhibited for some time in one of the committee rooms of the Senate Office Building.

THE GREAT AMERICAN SPA.

If Congress adopts the present suggestions the visitor of the future will enter Hot Springs from the railroad by a dignified central avenue lined upon the east by a series of bathhouses which, while highly individual, possesses a note of common feeling. Several are distinctly Spanish. Others, including the administration building, are inspired by Italian Renaissance. Yet all, treated freely, fall into a tasteful whole which is the more pleasing for its variety. At the end of the row is the Arlington Hotel.

Behind this rich architectural row rise abruptly low densely wooded rolling hills. These are reached by stairways through three street entrances between bathhouses, all leading to a park driveway behind and above the bath houses, from which walks carry into the hillside forest.

The first of these entrances rises to a richly paved and planted formal garden supported by a high wall on the east and bounded by a wall on the west, both to be covered by shrubbery and by vines dropping from above. This feature is really an elaborate camouflage of the unsightliest of the present premises, but so cunningly is it designed that the fact never will be suspected. The second is the formal entrance, broad and dignified, leading to a garden and a monumental conservatory which towers high above the red-tiled roofs of the bathhouses below. The third is a broad concert garden, flanked by rest houses and culminating in a band stand and plaza, a meeting and resting place to sit at ease and drink the healing waters. Next comes the great hotel with its broad porches.

THE LANDSCAPE BACKGROUND.

Back of these architectural creations, the hills, heavily forested, brilliant with flowering shrubs, cleft by winding canyons through which flow brooks, flanked by picturesque cliffs, the foothills of the Ozark Mountains, will be made accessible by walks, horse trails, and automobile roads.

One can find circuits of picturesque woodland walks to occupy an hour or several hours or a half day, with rest houses at convenient intervals. Or one can find a wide variety of horseback rides leading through deep glens and attaining eminences affording broad views. Or one can motor for hours over an elaborate system of roadways planned to develop the beauties of the neighboring mountain scenery. A motor trip of 60 miles over a highway now building by the State will land one in the stirring city of Little Rock.

Hot Springs, in short, is destined to become celebrated at home and perhaps abroad as the great American Spa. The American public is beginning to discover that these remarkable radioactive waters, besides their curative properties in the case of various ailments, are an amazing elixir of recuperation for those who have no ills except the wear and tear of active business and social life. Increasing thousands are combining the recuperative baths with the pleasures of the Ozark foothills.

THE FREE BATHHOUSE.

An apparently happy solution of a long-vexed question is that of the location of the free bathhouse. It is to be removed from its present unsightly location, which will become the site of one of the most attractive landscape features. The new plans place it on the corner of Central and Reserve Avenues, under the same roof as the administrative rooms on the street front. This part was planned to be carried out as soon as practicable, $190,000 having been appropriated for it, of which $50,000 came out of the revenues of the reservation.

Whether or not this location holds, it is hoped that the entire plan of development may be accepted by Congress, and worked out during the next few years. The architects estimate the cost of the whole, excluding the administrative building and public bathhouse, at $2,000,000.

A PROSPEROUS SEASON.

The year just past was one of the best in the history of the reservation. More than 140,000 persons visited the springs, an increase of 5,000 over the record year preceding. Always a favorite convention center, Hot Springs was favored last year by four gatherings of unusual interest, the General Federation of Women's Clubs, the executive council of the American Bankers' Association, the National Editorial Association, and the Southern Baptists.

Naturally, with so large an increase in attendance all activities substantially increased. Paid baths increased by 65,264; bathhouse receipts, $30,386.06; profits, $11,588.78. The year is also notable in the practical discontinuance of the obnoxious practice of drumming for hotel and bathhouse business.

PLATT NATIONAL PARK.

Again this year the number of visitors to Platt National Park substantially increased. Most of them came by motor. During the year 1,265 persons camped out in the park for three days or more. Visitors carried out with them 66,987 gallons of the medicinal waters for which this park is celebrated.

The year was signalized by the stopping of two of the park's best known springs, the Antelope and Buffalo, which constitute the source of Travertine Creek. The Antelope Springs lost half their volume last December and stopped in January, while the Buffalo ran at half capacity from the middle of January and stopped altogether in March. This stoppage is not considered alarming, because it has happened twice before; in both instances full flow resumed later on. So far the reasons for this peculiarity have not been discovered.

A great many minor improvements have been made in the park, including the building of many causeways at creek crossings and the enlargement of the swimming pool.

WIND CAVE NATIONAL PARK.

Unusually heavy rains affected the season at Wind Cave in two ways; they decreased the number of visitors, washed out road crossings, exposed rocks, and in many other ways made the roads to the reservation wretched. This has naturally increased the cost of road maintenance to the limit, without, however, bringing the roads back to anything like their normal excellence.

Food conditions were responsible for a change in the grazing situation this year. Horses were excluded, for one thing, as a measure to increase the meat production of the area materially. A limitation having been placed upon the number of cattle allowed to graze, an appreciable increase in the weight of beef was secured.

The game preserve in the northwestern corner of the park, maintained by the Biological Survey, includes about 4,160 acres, inclosed by a substantial woven-wire fence 88 inches in height. This was stocked in 1913 with a nucleus herd of 14 buffalo presented by the American Bison Society and the New York Zoological Society. Two bulls and four cows were transferred from the Yellowstone Park in 1916, and the herd now numbers 42 head. Losses by death have boundary, has given singular fitness to the park's use—warmly approved and forwarded by you—for the establishment of a national war memorial to France, Mount Desert Island's earliest possessor among the European peoples, and to our Nation's sons who nobly fall across the seas in her defense and for the cause of freedom. Such a memorial, on ground so placed and owned and rich in old historical associations, can not fail to be a lasting source of interest and inspiration to the multitudes of visitors who will annually seek this park in years to come. It is proposed to crystallize this idea in the title Lafayette National Park in the event of the region assuming park status.

BILLS TO MAKE IT A NATIONAL PARK.[1]

Two bills providing for the elevation of the Sieur de Monts National Monument to the national park class under the name of the Mount Desert National Park are now pending in the Public Lands Committee of the House of Representatives. S. 4569, by Senator Hale, of Maine, passed the Senate on June 29, 1918; H. R. 11935, by Mr. Peters, of Maine, introduced on May 4, 1918, was favorably considered at a hearing held on May 30 by a specially appointed subcommittee of the Public Lands Committee of the House, the proceedings of which have been printed. Your strong indorsement of this legislation in your report to Congress, and again in your statement of the policy that shall guide the approval or disapproval of new park projects, have materially accelerated its progress in the national legislature. Another bill, S. 4957, by Senator Hale, identical in language with S. 4569 as it passed the Senate, but providing for the creation of the Lafayette National Park instead of the Mount Desert National Park, was introduced on September 24, and passed the Senate on October, 3, 1918.

THE FIRST APPROPRIATION.

The appropriation of $10,000 in the last sundry civil act for the maintenance and protection of this park area gave it its first legislative recognition, a most important event in its public-life history. This fund is being devoted to the park land's administration; to the guardianship of its wild life—bird, animal, and plant; to the maintenance of old trails and existing improvements; and to surveys and planning for its future development. Constructive work and all improvements calling for it will be deferred until the close of the war, as I have already stated.

Travel to Bar Harbor and the monument in 1918 was lessened, as elsewhere, by war conditions and may be fairly indicated by a figure representing four-fifths of that of the previous season.

The eastern press has taken no little interest during the past year in this first eastern representative of our national parks. Many articles upon it have appeared in the papers and other current publications, and warm appreciation has been shown, but it more than justifies all in its unique beauty and recreational opportunities.

As on incentive elsewhere, the value of this example of generous public spirit preserving a great landscape to the people for a national possession and heritage forever is beyond estimation. Enterprise of such a character carried out in other portions of the country would save to beauty and freedom under national protection other masterpieces of nature vitally important to the public and essential to the completion of the land's exhibit—in its full natural range, from east to west and north to south, the finest under heaven.

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[1] See reports on bills, pp. 1041-1044.

CASA GRANDE NATIONAL MONUMENT.

Reference has been made to the change of status of this famous prehistoric building to that of a national monument. It was the third reservation which Congress made and it had been roughly classed as a national park. As a matter of fact President Wilson's proclamation of August 3, 1918, declaring it a national monument, does little more than confirm one of the several opinions.

Preceding this settlement of the question of status, Mr. Frank Pinkley was appointed custodian in place of Mr. James P. Bates. This was effective April 1, 1918. Mr. Pinkley has put in an exceedingly active summer in the improvement of the ruin and its surroundings. The Casa Grande is from 500 to 800 years old. It is a part of a walled village, several of the other buildings of which exist in considerable dilapidation in the neighborhood; the "great house" itself is in extraordinary condition for one of its age. The inhabitants of this and neighboring villages seem to have lived in a true stone age. They farmed extensively; their irrigation systems are shown, by their remains, to have been large and effective.

The last appropriations for the repair and upkeep of Casa Grande were secured in 1908 and soon exhausted. Since then, very little repair has been possible. No funds at all were available during the year ending June 30, 1918.

Since the change in custodianship plans have been made for bettering of conditions. At least there will be some cleaning up, a little necessary grading and a few inexpensive repairs. The new custodian also expects to get up signs on the desert approaches, and to fit up a simple rest house for the convenience and comfort of visitors.

Plans for later development include a fence for the reservation and a water supply for a proposed parking scheme. Properly repaired and equipped, this noble relic of the earliest American civilization will attract a large number of pilgrims.

ZION NATIONAL MONUMENT.

The first complete season since the establishment of the camp for the entertainment of visitors in Zion Canyon was successful notwithstanding the limitations imposed by war. The inability of the Los Angeles and Salt Lake Railroad, under Government instructions, to place any of the extensive advertising it had planned for the season was reflected, not only in a slender patronage by rail but in fewer visiting motors than were expected. The condition of the new approach road between the Arrowhead Trail and the Gates of Zion, a distance of 30 miles, did not help the situation. The roadbed will settle with age and increase the efficacy of the repairs which must be made as soon as practicable. The new road within the monument held its condition admirably.

Owing to the mild winter climate more than a hundred cars visited the monument between the closing of the Wylie Camp on October 28, 1917, and its reopening for the new season on June 8, 1918, a fact

And these gateways, superlative as they are, are but typical after all of the great city of gigantic painted temples that lies within. Zion Canyon is about the size of the Yosemite Valley; that is, 8 or 9 miles long by a couple of miles in its widest spot—usually by half a mile or less. And every mile, yes every rod, of it is sensational with its gorgeous walls and towers. It is truly the "desert Yosemite," but it is infinitely more besides. At its head the canyon narrows until, standing in the stream, one can literally touch both sides at once, and yet its walls rise 2,500 feet or more to a waving, interrupted thread of sky. Few spend the long, weary, toilsome hours necessary to reach these narrow beginnings, but it seems to me worth the effort.

I shall take an early opportunity to visit and study this wonderland of the Painted Desert.

EL MORRO NATIONAL MONUMENT, N. MEX.

Through the efforts of the custodian, Mr. Evon Z. Vogt, funds were secured for the improvement of the roads leading to the El Morro National Monument. During the year a number of improvements were made in the reservation, including the construction of a comfortable log building for the use of the traveling public, and of several needed foot bridges, as well as the fencing in of the area added to the monument last year. Signs bearing translations of the plainer and more important inscriptions made on El Morro, or Inscription Rock, by the ancient Spanish explorers were placed under the original inscriptions. The building of the new hotel, El Navajo, at Gallup and the establishment of better transportation service out of this city are bound to stimulate travel to El Morro and the famous pueblo of Zuni, which is not far distant. Improved roads in this wonderful section of the Southwest will also prove an incentive to travel.

MUIR WOODS NATIONAL MONUMENT, CAL.

The condition of the Muir Woods National Monument, the grove of redwood trees donated to the Government by Hon. William Kent and Mrs. Kent in 1908, was greatly improved. Four foot bridges of native redwood were built, and over 30 signs set up for the guidance of visitors. An attractive gateway was constructed where the Mill Valley automobile highway enters the monument. Some repair work on the roads inside the monument was done, and funds are now available for further improvement work on them, which will be undertaken in the spring. A number of deer and other animals have been observed feeding in the woods.

As this monument is not far from San Francisco, it naturally attracts many tourists, most of whom make the combination trip to Muir Woods and Mt. Tamalpais. The authorities of Marin County have under consideration a project, to be undertaken immediately at the close of the war, for the improvement of the road from Mill Valley and Sausalito to Bolinas Bay.

MONTEZUMA CASTLE NATIONAL MONUMENT, ARIZ.

A great deal of improvement work was done in the Montezuma Castle National Monument, under contract with Mr. Alston D.

Morse. The walls of the castle were strengthened and scrubbed, the floors supported by posts, and the débris removed from the floors of the castle, which is now in excellent condition. It was hoped to accomplish a little more work, but the shortage of labor, combined with the fact that Mr. Morse joined the Army, stopped the improvements temporarily. At the present time the most urgent improvement needed is the repair of the road and trail to the castle, and it is hoped that this work can be undertaken in the near future, as this cliff dwelling is remarkably interesting and should be made readily accessible to the public.

TUMACACORI NATIONAL MONUMENT, ARIZ.

The land on which stands the Tumacacori Mission, which was founded by Father Kino in the seventeenth century, was donated to the Government during the past year. When the national monument was established the Government claimed ownership of this land. The title was disputed, however, and the Supreme Court of the United States sustained the adverse claim in 1914. The mission remained in private ownership until a few months ago, when the owners of the tract donated to the Government the 10 acres on which the mission stands. The public-spirited action of the former owners in transferring this ancient ruin to the Government deserves the appreciation of the Service and of the country at large, as the opportunity is thus given to preserve one of the most interesting relics of the early Spanish exploration and settlement.

The donors of this property were James E. Bouldin, Jennie N. Bouldin, Helen Lee Bouldin, and Weldon M. Bailey. The preliminary work of preservation will begin as soon as practicable under the direction of Mr. Frank Pinkley, custodian of the Casa Grande National Monument.

DEVILS TOWER NATIONAL MONUMENT, WYO.

The road within the Devils Tower National Monument was repaired and greatly improved within the past year. The county commissioners of Crook County cooperated in this work to the extent of furnishing the necessary tools free of cost and supervising the performance of the work. The road is graded to a width of 20 feet or more. The average grade is 5 per cent, and it is less than 9 per cent in the steepest places. The road leading to the monument was also improved, the county bearing one-half the cost of the work performed outside of the monument. It is now very easy to go by automobile or carriage to the foot of the tower, that immense mass of rock which was used as a landmark by the Indians and early explorers. In fact, the new road is considered one of the best in the county.

PETRIFIED FOREST NATIONAL MONUMENT, ARIZ.

Mr. William Nelson, the custodian of the Petrified Forest National Monument, reports that the roads to and through this reservation are badly in need of repairs, those within the monument being barely passable. Mr. Nelson was appointed custodian on December 29, 1917, upon the resignation of Mr. Chester A. Campbell.

It is difficult for tourists to cross the beds of the streams during the dry season, owing to the amount of shifting sand that impedes their progress, and in flood times the Rio Puerco is impassable. A bridge across this river is an important improvement that is urgently needed. An estimate for road work was made last year, but no appropriation was granted. Despite the condition of the roads, the monument was visited by many tourists at all times of the year, so great was the public interest in the petrified trees.

LEWIS AND CLARK CAVERN NATIONAL MONUMENT, MONT.

It was hoped that a road to the main cavern of the Lewis and Clark Monument could be constructed during the past year, but this was found impracticable. Investigations of the approaches to the monument, however, and of the great limestone caverns, with their wonderful stalactite and stalagmite formations, were made preparatory to improving the reservation at the earliest opportunity. Mr. Oscar Rohn, of Butte, Mont., was appointed custodian of the reservation on December 14, 1917. Mr. Rohn reports that the ladders and steps leading to the various caverns are in excellent condition and that the entrances are well protected.

The country in the vicinity of the monument is very picturesque, and it is believed that when the roads are constructed and the caverns properly improved the reservation will attract many visitors.

SHOSHONE CAVERN NATIONAL MONUMENT, WYO.

The Shoshone Cavern National Monument, set aside to preserve the remarkable cavern known as "Ned Frost's Cave," is destined to become one of the attractions of the wonderful Cody route to Yellowstone National Park. This cave is in Cedar Mountain, which rises above the granite gorge of the Shoshone. A trail easy of ascent will soon be completed to the mouth of the cavern, and when the new road is constructed along the east side of the Shoshone to a point where the main gorge begins, this delightful side trip will be available to all Yellowstone visitors.

Even before the new road is completed it will be possible to make the trip by saddle horse, taking in many interesting points about Cody on the way to and from the cavern. It will be the purpose of the National Park Service, as well as the citizens of Cody, to make this monument one of the show places of the great eastern approach to Yellowstone Park.

SITKA NATIONAL MONUMENT, ALASKA.

The work of repairing the totem poles in the Sitka National Monument is to be commenced under an allotmentof $1,000 made for this purpose. Mr. E. W. Merrill, of Sitka, was appointed custodian of the monument on August 12, 1918, and the repair work will be done under his direction. There are eighteen of these interesting totem poles in the reservation, the largest of which is considered the most wonderful in all Alaska.

COLORADO NATIONAL MONUMENT, COLO.

Upon the completion of the township surveys in this region it was shown that the Colorado National Monument did not cover all the lofty monoliths intended by the original proclamation, and in order to have these included within the monument limits it is proposed to add about 3,500 acres. Most of this land lies adjacent to the present south and west boundaries of the reservation. A proclamation covering the new area has been prepared and will shortly be submitted to the President. Mr. John Otto, the custodian of the monument, has continued the repair and improvement of trails and such other work as he was able to accomplish through the cooperation of communities situated near the reservation.

CHACO CANYON NATIONAL MONUMENT, N. MEX.

An after-war project now under consideration by the Bureau of Ethnology is the excavation of the ruins in the Chaco Canyon National Monument and the restoration of their ancient irrigation systems. This project is receiving the personal attention of Dr. J. Walter Fewkes, chief of the bureau, and comprehensive plans are being made for this archæological work. The National Park Service will cooperate in every feasible way with the Smithsonian Institution and other museums and societies that may participate in executing this important scientific and historic work.

VERENDRYE NATIONAL MONUMENT, N. DAK.

During the year Mr. W. F. Thompson, the postmaster at Sanish, was appointed custodian of the Verendrye National Monument. Mr. Thompson, who is one of the pioneer settlers of the region, has always evinced keen interest in the reservation, and as custodian will be able to prevent trespassing and violations of the regulations of the National Park Service. It was from Crowhigh Mountain, the prominent butte in this monument, that Verendrye, the French explorer of the Northwest and the first white man to enter what is now North Dakota, made his observations before going farther west, and its historical associations draw many visitors to the reservation during the summer months.

There is nothing of importance to report with reference to the administration, protection, or improvement of the Gran Quivira, Dinosaur, Natural Bridges, Rainbow Bridge, Papago Saguaro, Pinnacles, Capulin Mountain, and Navajo National Monuments.

SOME MATTERS OF PERSONNEL.

During the year the employees of the National Park Service have responded generously to the various war funds and in the purchase of Liberty bonds their record has been nearly 100 per cent perfect. In the second, third, and fourth Liberty loan campaigns every member of the Washington force purchased bonds to the limit of his financial ability and the record of the field service approached this very closely.

In the purchase of war savings stamps the record of the employees of this bureau is also worthy of the highest commendation. In the sale of war savings stamps in the department the record of the employees of the National Park Service in Washington is $85.22 per capita. This places it at the head of the bureaus of the department and next to the Alaskan Engineering Commission, which heads the list at the present writing.

Aside from one resignation to volunteer in the Army, there have been no changes in the personnel of the Washington office of the bureau during the past year. In the field, however, there have been many resignations submitted by employees desiring to enter the military service voluntarily, or called thereto under the selective service law. A list of these men, as complete as it has been possible to make it, will be found in Appendix G. This is the honor roll of the National Park Service. Frank M. O'Brien, of Glacier Park, among the first to go, has already been listed among the wounded on the field of battle.

SUPERINTENDENTS NOW, NOT SUPERVISORS.

The designation of the park executives was changed on November 1, 1917, from supervisor to superintendent. Officers in charge of monuments are still called custodians. Chief Ranger L. C. Way, of Rocky Mountain National Park, was promoted to the superintendency of this park on November 1, 1917. The following entered the Service as custodians during the year: William Nelson, of Adamana, Petrified Forest National Monument, January 16, 1918, vice Chester Campbell, resigned; Oscar Rohn, of Butte, Mont., Lewis and Clark Cavern National Monument, February 18, 1918; William F. Thompson, of Sanish, N. Dak., Verendrye National Monument, March 1, 1918; Frank Pinkley, of Blackwater, Ariz., Casa Grande National Monument, April 1, 1918, vice James P. Bates, resigned; Walter Ruesch, of Springdale, Utah, Zion National Monument, August 12, 1918; E. W. Merritt, of Sitka, Alaska, Sitka National Monument, August 12, 1918.

Ernest P. Leavitt, chief clerk of the Yosemite National Park, was made assistant superintendent and special disbursing agent on July 1, 1918.

Charles P. Punchard, jr., of Denver, Colo., formerly landscape architect in the District of Columbia, was appointed landscape engineer of the National Park Service on August 1, 1918. He is attached to the field engineering division.

The work devolving upon the Washington office of the Service is increasing by leaps and bounds and has already reached a volume that can be handled only by fast and continuous work and some extension of the hours of labor. If this burden continues to increase, overtime activities will necessarily become the usual requirement. The force should be increased by four or five clerks, with entrance salaries not less than $1,080. The clerks now receiving $900 per annum should be increased to $1,200. They are performing service of a high order, and have remained here at a low rate of pay engaged in a labor of love when they could easily have commanded salaries considerably higher in other bureaus. Likewise, other members of the Service are underpaid when the responsible nature of their duties is considered with the loyal, efficient, conscientious work they perform.

A SOUND BUSINESS BASIS.

I venture the assertion that no bureau in Washington transacts as much business per individual employee as does the National Park Service. It is on a business basis, and I want to keep it there, but its growth must keep pace with the business required to transact. Merit, too, must be recognized and rewarded.

All appointments to places in the National Park Service are made after examination and proper certification in accordance with the civil service laws and regulations, except in the grades of superintendent, custodian, and ranger, which under Schedule A are excepted from examination. I expect to submit to you in the early future a plan of classification of the personnel of this bureau and with it a plan for making all appointments to the field force upon certification of eligibles by the Civil Service Commission, these eligibles to be secured by the commission in the regular way by examination. In other words, the time is nearly at hand, when, in the interest of good administration, all excepted places in the National Park Service can be made subject to all the rules of the classified civil service as to examination, certification, appointment, and dismissal of Government employees.

PROHIBITION IN ALL NATIONAL PARKS.

Hereafter no intoxicating liquor may be sold in any of the national parks and monuments under the jurisdiction of this Service. It has been our practice to regulate the sale of liquor in these reservations in accordance with the laws of the States and counties in which they are located, but we have not permitted the operation of saloons and barrooms in any of them. In the interest of safety to traffic in Yellowstone and Yosemite Parks, however, it was deemed advisable to prohibit the sale or open use of liquor, and an order to this effect was issued with your approval prior to the tourist season just past.

As Montana enters the list of dry States in January, 1919, intoxicating liquor may no longer be sold in Glacier National Park. In "bone-dry" States, the law is strictly enforced in the national parks and monuments located within their limits.

LEGISLATION.[1]

During the past year, the only legislation relating to national parks and monuments that has been enacted into law has formed part of appropriation acts. The sundry civil act of July 1, 1918,[2] carries appropriations in the total amount of $1,012,205, $962,205 to be expended by the National Park Service and $50,000 to be expended by the War Department in the construction and improvement of roads in Crater Lake National Park.[3] This act also authorizes the Department of the Interior to undertake the protection and improvement of Yellowstone National Park in accordance with the recommendations made in the annual report for 1917. Authority is also granted for beginning the development of Sieur de Monts National Monument in Maine. The law furthermore raises the limit in expenditure for buildings in the national parks from $1,000 to $1,500.

The urgent deficiency act of March 28, 1918,[4] granted authority for using $3,500 of the revenues of Yosemite Park to complete the new hydroelectric power plant.

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[1] See Appendix D for text of laws, proclamations, and committee reports.
[2] Public No. 181, 65th Congress.
[3] See detailed statements of appropriations in Appendix C, p. 1011.
[4] Public No. 109, 65th Congress.

S. 1419. "An act to amend an act entitled 'An act to regulate the construction of dams across navigable waters' approved June twenty-first, nineteen hundred and six, as amended by the act approved June twenty-third, nineteen hundred and ten, and to provide for the improvement and development of waterways for uses of interstate and foreign commerce," is the water-power bill which passed the Senate December 14, 1917 and the House of Representatives, September 5, 1918.[1] It is now pending in conference. The House amendment, which embodies the recommendations of the Secretaries of the Interior, War, and Agriculture as to the granting of water power permits, grants authority for the issuance of power permits in national parks and monuments "only after a finding by the commission that the license will not interfere or be inconsistent with the purpose for which such reservation was created or acquired, and shall be subject to and contain such conditions as the secretary of the department, under whose supervision such reservation falls, shall deem necessary for the adequate protection and utilization of such reservation." The term "reservation" is defined as "lands and interest in lands owned by the United States and withdrawn, reserved, or withheld from private appropriation and disposal under the public-land laws, and lands and interest in lands acquired and held for any public purpose."

Under section 17 of the act, 50 per cent of the charges arising from licenses for the development of power in the national parks is reserved and appropriated as a special fund to be expended in the improvement and development of the parks.

At first blush, this legislation may appear to open up the national parks for a use that has not heretofore been authorized. Such, however, will not be its precise effect. The following parks are now open to water power development under conditions not dissimilar from those contained in the pending measure: Yosemite, Sequoia, General Grant, Rocky Mountain, Hawaii, and Mount McKinley.[2]

In only two of these parks, however, have power permits been granted. These are Yosemite and Sequoia National Parks, and in both instances plants and other structures have been located so carefully that absolutely no injury has resulted to the parks, nor have they interfered with the use of these playgrounds. If the new law in relation to national parks is administered as wisely in the future as the old laws have been administered in the past, there should be no evil come from the granting of power permits under its provisions.

BILLS PASSED BY ONE HOUSE AND AWAITING THE OTHER'S ACTION.

No legislation relating solely to national parks or national monuments has been finally acted upon by Congress and sent to the White House for approval during the past year. The following measures, favorably considered by the Public Lands Committee of one or both branches of Congress, or passed by one House, are now awaiting further action.

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[1] See Report No. 715, House of Representatives, 65th Congress, 2d session.

[2] See act of Feb. 15, 1901 (31 Stat., 790), "An act relating to rights of way through certain parks, reservations, and other public lands"; act of Jan. 26, 1915 (38 Stat., 798), the Rocky Mountain National Park organic act; the act of Aug. 1, 1916 (39 Stat., 432), creating Hawaii National Park; and the act of Feb. 26, 1917 (39 Stat., 938), establishing the Mount McKinley National Park.

S. 390, "A bill to establish the Grand Canyon National Park," was introduced by Senator Ashurst on April 4, 1917. It was reported favorably by the Committee on Public Lands on March 21, 1918, and on May 16, was passed in the Senate by unanimous consent. The bill is now pending on the floor of the House, having been reported favorably on October 18. I feel that we are justified in expecting this measure to pass the House before the close of the Sixty-fifth Congress.

S. 1555, "A bill to repeal the last proviso of section four of an act to establish the Rocky Mountain National Park, in the State of Colorado, and for other purposes, approved January twenty-sixth, nineteen hundred and fifteen," was introduced April 10, 1917, by Senator Shafroth. The Public Lands Committee submitted a favorable report on the bill October 5, 1917, and on February 5, 1918, the bill passed the Senate. H. R. 171, a bill identical with this measure, was introduced in the House by Mr. Timberlake on April 2, 1917, and was reported favorably by the Committee on the Public Lands on March 12, 1918. It was placed on the calendar for unanimous consent, but on two occasions, March 23 and June 3, when reached in calling this calendar, objection was made to its passage. When this bill is taken up for final consideration, S. 1555 will, of course, be substituted for it under the rules of the House. There seems to be every reason for believing this meritorious bill will pass in the early future.

S. 4569, "A bill to establish the Mount Desert National Park in the State of Maine," was introduced on May 21, 1918, by Senator Hale, of Maine. The bill proposes to elevate the Sieur de Monts National Monument to the national park status. It was reported from the Committee on Public Lands on June 12, and passed the Senate on July 1. On May 4, 1918, Mr. Peters, of Maine, introduced in the House, H. R. 11935, a bill to create the Mount Desert Park. A hearing on this bill was held by a subcommittee of the Committee on the Public Lands on May 30, and the proceedings were subsequently printed. The full committee now has before it the Senate act and the report of the subcommittee. Another bill, S. 4957, "A bill to establish the Lafayette National Park in the State of Maine," was introduced by Senator Hale on September 24, 1918. The provisions of this bill are the same as those of S. 4569, the only change being in the name. This bill was reported by the Committee on Public Lands on October 3, and passed the Senate on the same day.

S. 41, "A bill to authorize the sale of certain lands at or near Yellowstone, Montana, for hotel and other purposes," was introduced on April 4, 1917, by Senator Walsh, of Montana. This legislation contemplates the sale of a tract of land near the western gateway of the Yellowstone National Park to the Oregon Short Line Railroad, a part of the Union Pacific system. The land will be used for hotel and station purposes when acquired by the railroad company. The bill was reported favorably from the committee on February 7, 1918, and passed the Senate on March 13. On April 6 it was favorably considered by the House Public Lands Committee and is now on the calendar of the House awaiting final action.

S. 4439, "A bill to provide for the survey of a national highway connecting certain national monuments in the States of Utah, Arizona, and New Mexico," was introduced on April 25, 1918, by Senator King, of Utah. The bill provides for the survey of a route for a road to connect the Mesa Verde National Park and the following national monuments: Zion, Grand Canyon, Rainbow Bridge, and Natural Bridges. Twenty thousand dollars is to be appropriated for the purpose. The bill was reported favorably to the Senate on June 13.

S. 4472, "A bill providing for the sale of public lands for the purpose of using the proceeds arising therefrom in the construction of roads and other permanent improvements in national parks," was introduced on May 2, 1918, by Senator Shafroth, of Colorado. This bill provides that the Secretary of the Interior be authorized to reserve and sell at public auction in each of the States in which national parks are located, unappropriated, unreserved, nonmineral public lands in amount equal to the total area of the national parks within such State, and use the proceeds in improving the parks and the approaches thereto. The bill was favorably reported to the Senate on October 7, 1918.

Reports on all of the above bills quote strong indorsements by this Department.

Other national park measures likely to receive early consideration by Congress follow:

H. R. 10929, "A bill to add certain lands to Sequoia National Park," was introduced on March 21, 1918, by Mr. Elston, of California. On March 26 a hearing was held on this measure by a subcommittee of the Public Lands Committee of the House, on which occasion William E. Colby, president of the Sierra Club, and Lieut. Commander Alexander G. McAdie, of Harvard University, spoke in behalf of this project. A similar bill, S. 2021, introduced on April 21, 1917, by Senator Phelan, of California, is pending in the Senate.

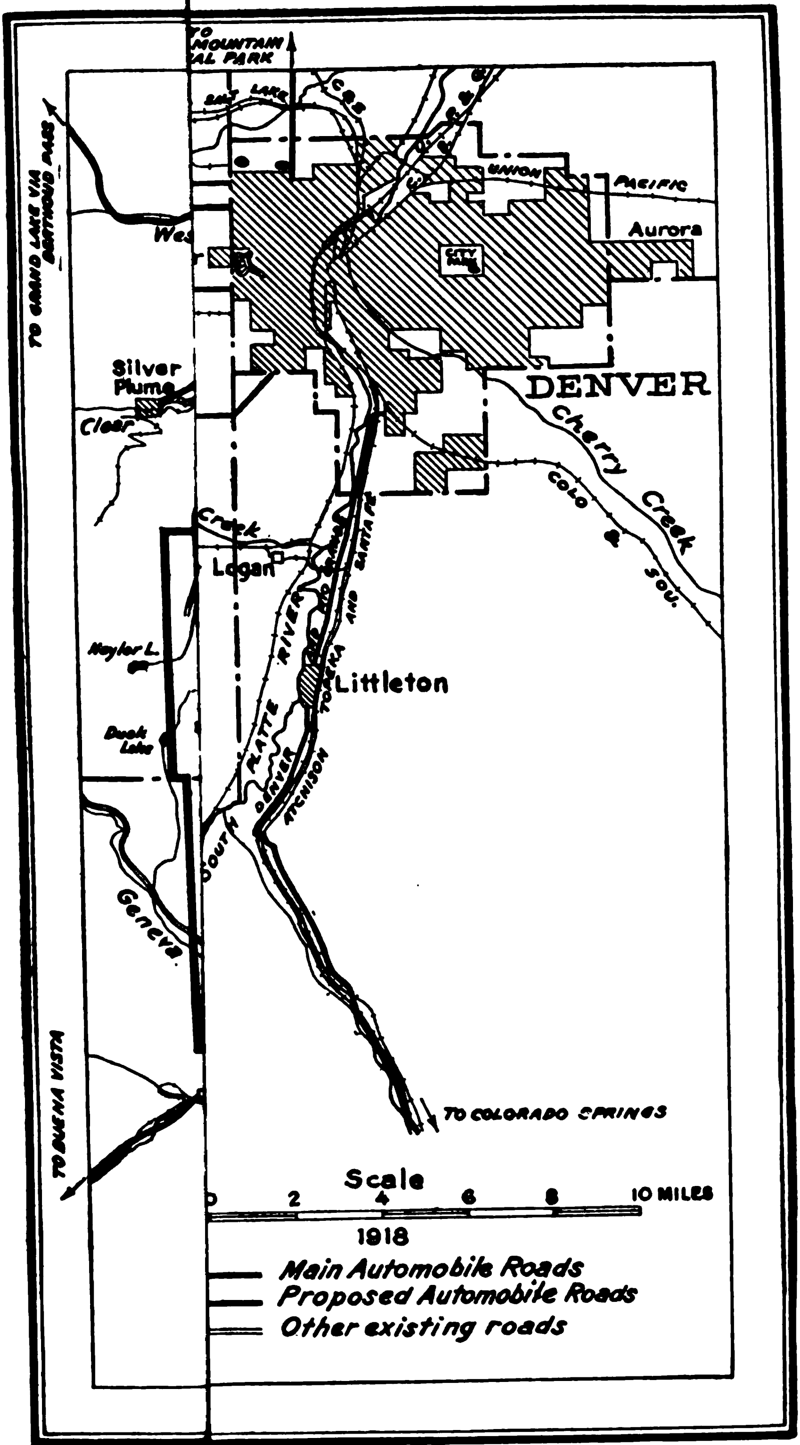
H. R. 11661, "A bill to add certain lands to the Yellowstone National Park," introduced on April 24, 1918, by Congressman Mondell, of Wyoming.

S. 4283, "A bill to add certain lands to Crater Lake National Park, Oregon," introduced on April 6, 1918 by Senator McNary, of Oregon.

S. 3587, "A bill to establish the Denver National Park," introduced on January 21, 1918, by Senator Shafroth, and a similar bill, H. R. 9220, introduced on January 24 by Mr. Hilliard, of Colorado.

S. 2291, "A bill creating the National Park of the Cliff Cities," introduced on May 11, 1917, by Senator Jones of New Mexico, and a similar measure, H. R. 3215, introduced on April 16, 1917, by Mr. Walton, of New Mexico. These bills propose to establish a national park to include the Bandelier National Monument and other lands in New Mexico upon which valuable relics of prehistoric peoples are located.

H. R. 6066, "A bill to establish the Mount Baker National Park," introduced on September 14, 1917, by Mr. Hadley, of Washington, and similar bills, S. 3662, introduced on January 31, 1918, by Senator Jones of Washington, and S. 4014, introduced on March 5, 1918, by Senator Poindexter, of Washington.


TO MOUNTAIN AL PARK
TO GRAND LAKE VIA BERTHOUD PASS
SALT LAKE
C&S
UNION
PACIFIC
Aurora
Wes
CITY PARK
Silver Plume
Clear
DENVER
Cherry Creek
COLO & SOU.
Creek
Logan
Naylor L.
Duck Lake
Littleton
SOUTH PLATTE RIVER
DENVER RIO GRANDE
ATCHISON TOPEKA AND SANTA FE
Geneva
TO BUENA VISTA
TO COLORADO SPRINGS
Scale
0 2 4 6 8 10 MILES
1918
Main Automobile Roads
Proposed Automobile Roads
Other existing roads

PRESIDENTIAL PROCLAMATIONS.[1]

Few changes in the monument system by Executive proclamation were made during the year. On March 18, 1918, the Mukuntuweap National Monument in southeastern Utah was enlarged and the name of the reservation was changed to Zion National Monument. The scope of this proclamation has been referred to in another part of this report.

On August 3, 1918, the Casa Grande Ruin in Arizona, set apart by Executive orders of June 22, 1892, and December 10, 1909, under the act of March 2, 1889, and heretofore placed in the category of national parks for the sake of convenience and to avoid confusion, was declared to be a national monument by President Wilson.

On September 24, 1918, the President established the Katmai National Monument in Alaska, to protect from depredation and unauthorized explorations the great volcanic area embracing the Mount Katmai region and the Valley of the Ten Thousand Smokes. This new reservation is mentioned elsewhere in the report.[2]

Summarizing previous statements, the national monument proposals pending at the present time are:

1. The Hovenweep project, which has for its purpose the protecting of the wonderful prehistoric towers near the Colorado-Utah boundary line in the Mesa Verde country.
2. The Scotts Bluff project, which contemplates the preservation of historic and scenic Scotts Bluff, Nebr.
3. The Palm Canyon, Cal., project, the object of which is to safeguard from extinction the species of palm known as "Washingtonia filamentosa."

NEEDS OF THE NATIONAL PARK SERVICE.

The urgent needs of the National Park Service may be stated briefly as follows:

1. The bill providing for the repeal of the inhibition on the appropriation of Federal funds for the improvement of Rocky Mountain National Park should be enacted into law, in order that the broad-gauge development of this big park may be undertaken immediately after the war.
2. The Grand Canyon should be added to the national park system.
3. The Sieur de Monts National Monument should be made a national park.
4. The Sequoia National Park should be enlarged to include the high Sierra region adjoining it on the north and east, as proposed in pending legislation.
5. The Yellowstone National Park should be enlarged to include the Teton Mountains, Jackson Lake, and all of the scenic region lying north of the Buffalo Fork of the Snake River, and the entire basin at the headwaters of the Yellowstone River.
6. Authority should be granted for the establishment of a touring division in the Washington office of the Service, and sufficient funds provided for the development of comprehensive plans looking toward

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[1] See Appendix D for text of proclamations.

[2] See p. 834. See proclamation on p. 1035.

the encouragement of travel in America after the war. Also the work of the educational division should be continued on a broader scale, which only a reasonable appropriation can make possible.

7. Game preserves should be established adjacent to several national parks in order that game may be better protected in the winter season. This important requirement is discussed on page 22.

8. Timber along scenic highways in or approaching several national parks, notably Yosemite, Mount Rainier, and Glacier, should be acquired from private owners, and its preservation for all time made certain.

9. Sufficient funds are required to maintain and protect all of the national parks during the war period in order that their improvements and natural features may suffer no deterioration or impairment.

10. Initial appropriations should be made at once in order that the National Park Service may assume jurisdiction of Mount McKinley and Lassen Volcanic National Parks.

IN CONCLUSION.

In conclusion, let me say that it has not been easy to labor for peace in time of war. The call of our country in her hour of need has sounded loud in very willing ears; we all of us have earnestly longed for some part in winning the war.

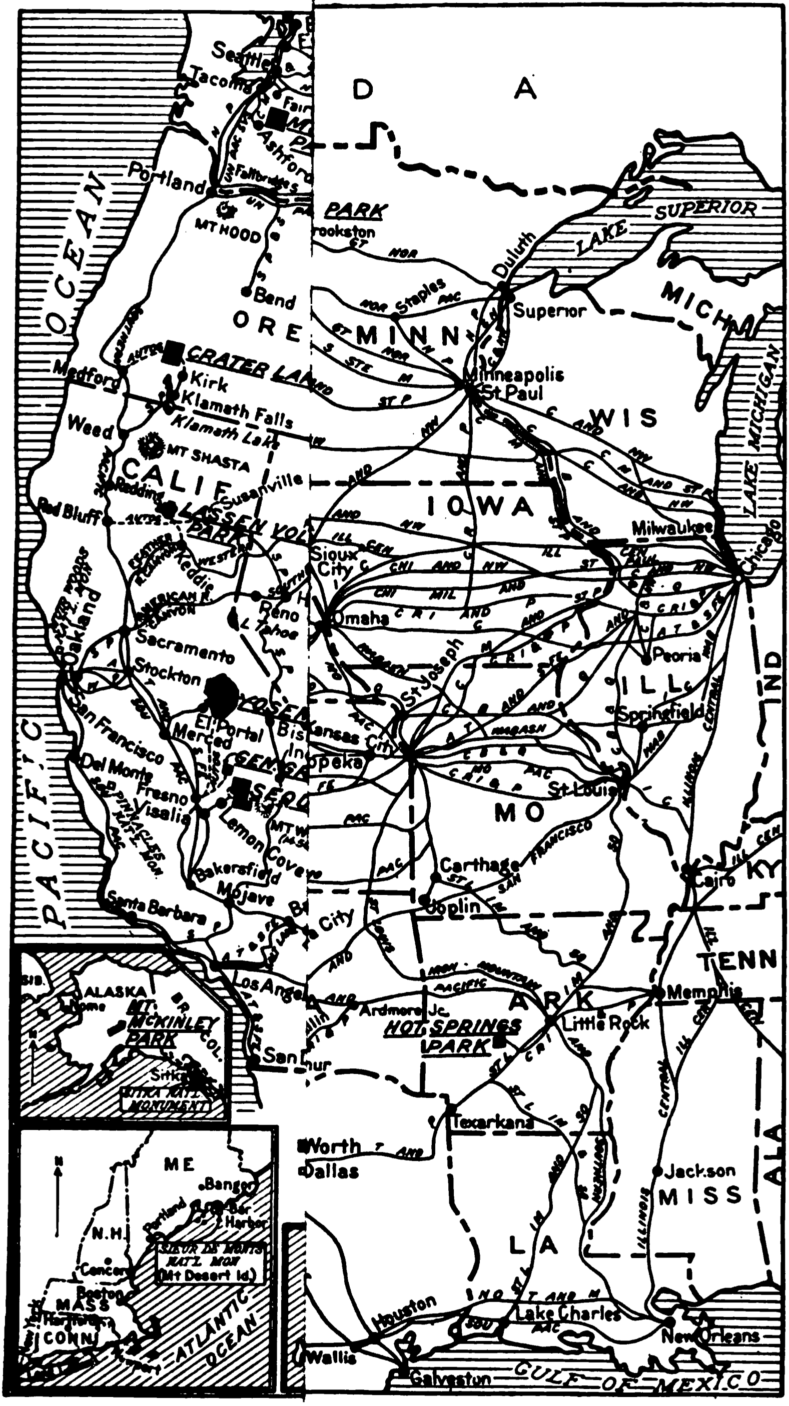
The duty, however, which has kept us laboring at more than our wonted speed, because of the promise of the parks' greatly increased usefulness at war's end, has had its compensations. Our national parks afforded relief, inspiration, and restoration to hundreds of thousands of war-weary Americans. The first season of war brought an increase of 37 per cent of visitors over the best record of peace, a fact which speaks for itself; and the season just closing, the second of the war, started bravely for still a higher record. It scored a large winter increase of travel at Hot Springs, Ark., but dropped a little back of last year's when, in the late spring, war exigencies compelled the Government to discourage unnecessary passenger travel.

I feel that the national parks have fully qualified for an important place among the agencies which have kept this Nation fit for war, and I look forward with confidence to their realization, after the coming of peace, of a broad and important destiny.

Very respectfully,

STEPHEN T. MATHER,
Director.

The SECRETARY OF THE INTERIOR.



SIXTEEN NATIONAL PARKS G 1,939 SQUARE MILES OR 1,241,265.04 ACRES, ADMINISTERED BY T TED SEPTEMBER 24, 1918, NOT SHOWN ON THIS MAP.

APPENDIX A.

THE NATIONAL PARKS AND MONUMENTS.

Map showing location of all national parks and monuments administered by National Park Service, Department of the Interior. See opposite page.

The national parks administered by the National Park Service, Department of the Interior.

The national military and other parks administered by the War Department.

The national monuments administered by the National Park Service, Department of the Interior.

The national monuments administered by the Department of Agriculture.

The national monuments administered by the War Department.

Organization of the National Park Service.

THE NATIONAL PARKS.

ADMINISTERED BY THE NATIONAL PARK SERVICE, DEPARTMENT OF THE INTERIOR.

[Number, 16; total area, 9,773 square miles; chronologically in order of creation.]

Name.	Location.	When established.	Statute reference.	Area (square miles).	Area (acres).	Private lands (acres).	Visitors, 1918.	Special characteristics.
Hot Springs Reservation.	Middle Arkansas	Apr. 20, 1832	4 Stat., 505 21 Stat., 288	1½	911.63	None.	[2] 140,000	46 hot springs possessing curative properties—Many hotels and boarding houses—20 bathhouses under public control.
Yellowstone	Wyoming, Montana, and Idaho.	Mar. 1, 1872	17 Stat., 32, 33	[1] 3,348	2,142,720	None.	21,275	More geysers than in all rest of world together—Boiling springs—Mud volcanoes—Petrified forests—Grand Canyon of the Yellowstone, remarkable for gorgeous coloring—Large lakes—Waterfalls—Vast wilderness inhabited by deer, elk, bison, moose, antelope, bear, mountain sheep, etc.—Greatest wild bird and animal preserve in world.
Sequoia (sē-kwoi′å)	Middle eastern California	Sept. 25, 1890	26 Stat., 478, 650.	252	161,597	3,049.81	15,001	The Big Tree National Park—12,000 sequoia trees over 10 feet in diameter, some 25 to 36 feet in diameter—Towering mountain ranges—Startling precipices—Cave of considerable size—Fine trout fishing.
Yosemite (yō-sĕm′ĭ-tē)	do	Oct. 1, 1890	26 Stat., 650 33 Stat., 702 34 Stat., 831	1,125	719,622.4	[4] 17,800	33,527	Valley of world-famed beauty—Lofty cliffs—Romantic vistas—Waterfalls of extraordinary height—3 groves of big trees—Large areas of snowy peaks—Waterwheel Falls—Good trout fishing.
General Grant	do	do	26 Stat., 650	4	2,536	160	15,496	Created to preserve the celebrated General Grant Tree, 35 feet in diameter—6 miles from Sequoia National Park.
Mount Ranier (rā-nēr′)	West central Washington	Mar. 2, 1899	30 Stat., 993	324	207,360	18.2	43,901	Largest accessible single peak glacier system—28 glaciers, some of large size—48 square miles of glacier, 50 to 500 feet thick—Wonderful sub-alpine wild-flower fields.
Crater Lake	Southern Oregon	May 22, 1902	32 Stat., 202	249	159,360	2,458.11	13,231	Lake of extraordinary blue in crater of extinct volcano, no inlet, not outlet—Sides 1,000 feet high—Interesting lava formations—Fine fishing.
Wind Cave	South Dakota	Jan 9, 1903	32 Stat., 765	17	10,899.22	None.	14,431	Cavern having many miles of galleries and numerous chambers of considerable size containing many peculiar formations.
Platt	Southern Oklahoma	July 1, 1902 Apr. 21, 1904	32 Stat., 641, 655. 33 Stat., 220	1⅓	848.22	None.	[3] 36,000	Many sulphur and other springs possessing medicinal value.

Sullys Hill	North Dakota	Apr. 27, 1904	33 Stat., 322, 323, 2368.	1¼	780	None.	4,188	Small park with woods, streams, and a lake—Is an important wild-animal preserve.
Mesa Verde (mā'sȧ vĕr'dȧ)	Southwestern Colorado	June 29, 1906	34 Stat., 616	77	42,376	880	2,058	Most notable and best preserved prehistoric cliff dwellings in United States, if not in the world.
Boundary changed	do	June 30, 1913	38 Stat., 82, 83, 84		48,966.4	993		
Glacier (glā'shēr)	Northwestern Montana	May 11, 1910	36 Stat., 354	1,534	981,681	16,508.11	9,086	Rugged mountain region of unsurpassed Alpine character—250 glacier-fed lakes of romantic beauty—60 small glaciers—Precipices thousands of feet deep—Almost sensational scenery of marked individuality—Fine trout fishing.
Rocky Mountain	North middle Colorado	Jan. 26, 1915	38 Stat., 798	358	229,062	[2]3,745	[2]101,497	Heart of the Rockies—Snowy range, peaks 11,000 to 14,250 feet altitude—Remarkable records of glacial period.
Boundary changed	do	Feb. 14, 1917	39 Stat., 916	397½	254,327	[2]20,693		
Hawaii (hä-wī'ē)	Hawaiian Islands	Aug. 1, 1916	39 Stat., 432	118	75,295	[2]41,000	([3])	3 separate areas: 2—Kilauea, continuously active for century and Mauna Loa, altitude 13,675 (largest active volcano in world, erupting every decade), are on Hawaii; Haleakala, on Maui, 10,000 feet high, with tremendous rift in summit 8 miles across and 3,000 feet deep; contains many cones, gorgeous tropical forests, mahogany groves, and lava caves; erupted 200 years ago.
Lassen Volcanic (lăs'ĕn)	Northern California	Aug. 9, 1916	39 Stat., 442	124	79,561.58	880	2,000	Only active volcano in United States proper—Lassen Peak, 10,465 feet in altitude—Cinder Cone, 6,879 feet—Hot springs—Mud geysers—Ice caves—Majestic canyons—Numerous lakes—Fine forests.
Mount McKinley	South central Alaska	Feb. 26, 1917	39 Stat., 938	2,200	1,408,000	None.	([3])	Highest mountain in North America (altitude 20,300 feet)—Rises higher above surrounding country than any other mountain in world.

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[1] In Wyoming, 3,114 square miles; in Montana, 198 square miles; in Idaho, 36 square miles.

[2] Estimated.

[3] No record kept.

[4] By recent transaction, not yet formally completed, the private holdings have been reduced to approximately 10,800 acres.

THE NATIONAL MILITARY AND OTHER PARKS.

ADMINISTERED BY THE WAR DEPARTMENT.

[Number, 7; total area, 22 square miles; chronologically in order of creation.]

Name.	Location.	When established.	Statute reference.	Area (acres).	Special characteristics.
Chickamauga and Chattanooga	Georgia and Tennessee	Aug. 19, 1890	26 Stat., 333, 978.	6,543	Beautiful natural park—Embraces battle fields of Chickamauga and Missionary Ridge and scenes of other conflicts of the Civil War fought in the vicinity of Chattanooga during 1863.
Antietam battle field	Maryland	Aug. 30, 1890	26 Stat., 401	50	Scene of one of the greatest battles of the Civil War.
Shiloh	Tennessee	Dec. 27, 1894	28 Stat., 597	3,546	Natural park embracing the battle field of Shiloh near Pittsburg Landing.
Gettysburg[1]	Pennsylvania	Feb. 11, 1895	28 Stat., 651	2,451	Beautiful natural park—Scene of Civil War combat—Probably better marked than any other battlefield in the world.
Vicksburg	Mississippi	Feb. 21, 1899	30 Stat., 841	1,323	Beautiful natural park—Scene of the siege and surrender of Vicksburg in 1863 during the Civil War.
Lincoln's birthplace[1]	Kentucky	July 17, 1916	39 Stat., 385		Contains the log cabin and part of the farm where Abraham Lincoln was born.
Guilford Courthouse	North Carolina	Mar. 2, 1917	39 Stat., 996	125	Near Greensboro—Scene of one of the great battles of the Revolution; fought in 1781.

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[1] Donated in whole or in part to the United States.

THE NATIONAL MONUMENTS.

ADMINISTERED BY THE NATIONAL PARK SERVICE, DEPARTMENT OF THE INTERIOR.

[Number, 24; total area, 1,989 square miles; chronologically in order of creation.]

Name.	Location.	Date of creation.	Statute reference of proclamation.	Area (acres).	Special characteristics.
Devils Tower	Wyoming	Sept. 24, 1906	34 Stat., 3236	1,152	Remarkable natural rock tower, of volcanic origin, 1,200 feet in height.
Montezuma Castle	Arizona	Dec. 8, 1906	34 Stat., 3265	[1] 160	Prehistoric cliff-dwelling ruin of unusual size situated in a niche in face of a vertical cliff. Of scenic and ethnological interest.
El Morro	New Mexico	Dec. 8, 1906 June 18, 1917	34 Stat., 3264 40 Stat., Proc., 1377.	160 240	Enormous sandstone rock eroded in form of a castle, upon which inscriptions have been placed by early Spanish explorers. Contains cliff-dweller ruins. Of great historic, scenic, and ethnologic interest.
Petrified Forest	Arizona	Dec. 8, 1906 July 31, 1911	34 Stat., 3266 37 Stat., 1716	25,625	Abundance of petrified coniferous trees, one of which forms a small natural bridge. Is of great scientific interest.

Chaco Canyon (chä'kō)	New Mexico	Mar. 11, 1907	35 Stat., 2119	[1] 20,629	Numerous cliff-dweller ruins, including communal houses, in good condition, and but little excavated.
Muir Woods [2] (mūr)	California	Jan. 9, 1908	35 Stat., 2174	295	One of the most noted redwood groves in California, and was donated by Hon. William Kent, ex-Member of Congress. Located 7 miles from San Francisco.
Pinnacles	do	Jan. 16, 1908	35 Stat., 2177	2,080	Many spirelike rock formations, 600 to 1,000 feet high, visible many miles; also numerous caves, and other formations.
Natural bridges	Utah	Apr. 16, 1908 Sept. 25, 1909 Feb. 11, 1916	35 Stat., 2183 36 Stat., 2502 39 Stat., 1764	120 [1] 2,740 [1] 2,740	3 natural bridges, among largest examples of their kind. Largest bridge is 222 feet high, 65 feet thick at top of arch; arch is 28 feet wide; span, 261 feet; height of span, 157 feet. Other two slightly smaller.
Lewis and Clark Cavern [2]	Montana	May 11, 1908 May 16, 1911	35 Stat., 2187 37 Stat., 1679	160 160	Immense limestone cavern of great scientific interest, magnificently decorated with stalactite formations. Now closed to public because of depredations by vandals.
Tumacacori (tū-mä-kä'kō-rē)	Arizona	Sept. 15, 1908	35 Stat., 2205	10	Ruin of Franciscan mission dating from sixteenth century, until recent years in fair preservation, but now rapidly disintegrating.
Navajo (năv'á-hō)	do	Mar. 20, 1909 Mar. 14, 1912	36 Stat., 2491 37 Stat., 1733	[1] 600 360	Numerous pueblo, or cliff-dweller ruins, in good preservation.
Zion	Utah	July 31, 1909 Mar. 18, 1918	36 Stat., 2498 40 Stat., Proc., 1435.	[1] 15,840 [1] 76,800	Magnificent gorge (Zion Canyon), depth from 800 to 2,000 feet, with precipitous walls. Of great beauty and scenic interest.
Shoshone Cavern (shō-shō'nē)	Wyoming	Sept. 21, 1909	36 Stat., 2501	210	Cavern of considerable extent, near Cody
Gran Quivira (grăn kē-vē'rä)	New Mexico	Nov. 1, 1909	36 Stat., 2503	[1] 160	One of the most important of earliest Spanish mission ruins in the Southwest. Monument also contains Pueblo ruins.
Sitka	Alaska	Mar. 23, 1910	36 Stat., 2601	[1] 57	Park of great natural beauty, and historic interest as scene of massacre of Russians by Indians. Contains 16 totem poles of best native workmanship.
Rainbow Bridge	Utah	May 30, 1910	36 Stat., 2703	160	Unique natural bridge of great scientific interest and symmetry. Height 309 feet above water, and span is 278 feet, in shape of rainbow.
Colorado	Colorado	May 24, 1911	37 Stat., 1681	13,883	Many lofty monoliths, and is wonderful example of erosion, and of great scenic beauty and interest.
Papago Saguaro (pä'pä-gō sä-gwä'rō).	Arizona	Jan. 31, 1914	38 Stat., 1991	2,050	Splendid collection of characteristic desert flora and numerous pictographs. Interesting rock formations.
Dinosaur (dī'nō-sôr)	Utah	Oct. 4, 1915	39 Stat., 1752	80	Deposits of fossil remains of prehistoric animal life of great scientific interest.
Sieur de Monts [2] (sē-eûr dē mōnt)	Maine	July 8, 1916	39 Stat., 1785	[1] 5,000	Mountainous area adjacent to Bar Harbor, which includes 10 mountains and several lakes. Is very wild and rugged. Most romantic and beautiful mingling of mountain and ocean scenery on Atlantic coast.
Capulin Mountain (kăp'ū-lĭn)	New Mexico	Aug. 9, 1916	39 Stat., 1792	681	Cinder cone of geologically recent formation.
Verendrye (vĕr-rŏn-drē)	North Dakota	June 29, 1917	40 Stat., Proc., 1380.	253.04	Includes Crowhigh Butte, peculiar mountain formation, from which Explorer Verendrye first beheld territory beyond Missouri River.
Casa Grande (kä'sä grän'dá)	Arizona	Mar. 2, 1889[3] Dec. 10, 1909 Aug. 3, 1918	25 Stat., 961 36 Stat., 2504 40 Stat., Proc., 1470.	480	These ruins are one of the most noteworthy relics of a prehistoric age and people within the limits of the United States. Discovered in ruinous condition in 1694.
Katmai (kăt'mī)	Alaska	Sept. 24, 1918	40 Stat., Proc., 1487.	[1] 1,088,000	Wonderland of great scientific interest in the study of volcanism. Phenomena exist upon a scale of great magnitude. Includes "Valley of Ten Thousand Smokes."

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[1] Estimated.

[2] Donated to the United States.

[3] From Mar. 2, 1889, until Aug. 3, 1918, classified as a National Park.

THE NATIONAL MONUMENTS.

ADMINISTERED BY THE DEPARTMENT OF AGRICULTURE.

[Number, 11; total area, 1,769½ square miles; chronologically in order of creation.]

Name.	Location.	Date of creation.	Statute reference of proclamation.	Area (acres).	Special characteristics.
Gila Cliff Dwellings (hē′lä)	New Mexico	Nov. 16, 1907	35 Stat., 2162	160	Numerous cliff-dweller ruins of much interest and in good preservation.
Tonto	Arizona	Dec. 19, 1907	35 Stat., 2168	[1] 640	Do.
Grand Canyon	do	Jan. 11, 1908	35 Stat., 2175	[1] 806,400	Includes the most wonderful portion of the Grand Canyon of the Colorado.
Jewel Cave	South Dakota	Feb. 7, 1908	35 Stat., 2180	[1] 1,280	Limestone cavern of much beauty and considerable extent, limits of which are as yet unknown.
Wheeler	Colorado	Dec. 7, 1908	35 Stat., 2214	300	Of much interest from geological standpoint as example of eccentric erosion and extinct volcanic action. Of much scenic beauty.
Mount Olympus	Washington	Mar. 2, 1909 Apr. 17, 1912 May 11, 1915	35 Stat., 2247 37 Stat., 1737 39 Stat., 1726	608,640 608,480 299,370	Contains many objects of great and unusual scientific interest, including many glaciers. Is summer range and breeding ground of the Olympic elk.
Oregon Caves	Oregon	July 12, 1909	36 Stat., 2497	480	Extensive caves in limestone formation of much beauty; magnitude not entirely ascertained.
Devil Postpile	California	July 6, 1911	37 Stat., 1715	800	Spectacular mass of hexagonal basaltic columns, like an immense pile of posts. Said to rank with famous Giant's Causeway in Ireland.
Walnut Canyon	Arizona	Nov. 30, 1915	39 Stat., 1761	960	Contains cliff dwellings of much scientific and popular interest.
Bandelier (Bän-dĕ-lēr′)	New Mexico	Feb. 11, 1916	39 Stat., 1764	22,075	Vast number of cliff-dweller ruins, with artificial caves, stone sculpture, and other relics of prehistoric life.
Old Kasaan (kä-sän′)	Alaska	Oct. 25, 1916	39 Stat., 1812	38.3	Abandoned Indian village in which there are numerous remarkable totem poles and other objects of historical interest.

[1] Estimated.

THE NATIONAL MONUMENTS.

ADMINISTERED BY THE WAR DEPARTMENT.

[Number, 2; total area, 6 acres; chronologically in order of creation.]

Name.	Location.	Date of creation.	Statute reference of proclamation.	Area (acres).	Special characteristics.
Big Hole Battle Field [1]	Montana	June 23, 1910		5	Site of battlefield on which battle was fought Aug. 9, 1877, between a small force of United States troops and a much larger force of Nez Perce Indians, resulting in rout for the Indians.
Cabrillo (kä-brēl′yō)	California	Oct. 14, 1913	38 Stat., 1965	1	Of historic interest because of discovery of the territory now partly embraced in the State of California by Juan Rodrigues Cabrillo, who at this point first sighted land on Sept. 28 1542.

[1] Set aside by Executive order.

ORGANIZATION OF THE NATIONAL PARK SERVICE.

WASHINGTON OFFICE.

Stephen T. Mather, director.
Horace M. Albright, assistant director.
F. W. Griffith, chief clerk.
Robert Sterling Yard, chief, educational division.

FIELD SERVICE.

ENGINEERING DIVISION.

George E. Goodwin, civil engineer.
Charles P. Punchard, jr., landscape engineer.

ACCOUNTING DIVISION.

C. G. Smith, examiner of accounts.

THE NATIONAL PARKS.

Crater Lake, Alex Sparrow, superintendent.
Glacier, W. W. Payne, superintendent.
Hot Springs, Dr. Wm. P. Parks, superintendent.
Mesa Verde, Thomas Rickner, superintendent.
Mount Rainier, D. L. Reaburn, superintendent.
Platt, R. A. Sneed, superintendent.
Rocky Mountain, L. C. Way, superintendent.
Sequoia, Walter Fry, superintendent.
General Grant, Walter Fry, acting superintendent.
Sullys Hill, S. A. M. Young, acting superintendent.
Wind cave, T. W. Brazell, superintendent.
Yellowstone, Chester A. Lindsley, acting superintendent.
Yosemite, W. B. Lewis, superintendent.

THE NATIONAL MONUMENTS.

Capulin Mountain, Mrs. W. H. Jack, custodian.
Casa Grande, Frank Pinkley, custodian.
Colorado, John Otto, custodian.
El Morro, Evon Z. Vogt, custodian.
Lewis and Clark Cavern, Oscar Rohn, custodian.
Montezuma Castle, O. F. Hicks, custodian.
Muir Woods, Andrew Lind, custodian.
Navajo, John Wetherill, custodian.
Petrified Forest, Wm. Nelson, custodian.
Sieur de Monts, George B. Dorr, custodian.
Sitka, E. W. Merrill, custodian.
Verendrye, W. F. Thompson, custodian.
Zion, Walter Ruesch, custodian.

No superintendents or custodians have been appointed for the Hawaii, Lassen Volcanic, or Mount McKinley National Parks, or for the Chaco Canyon, Devils Tower, Dinosaur, Gran Quivira, Katmai, Natural Bridges, Papago Saguaro, Pinnacles, Rainbow Bridge, Shoshone Cavern, or Tumacacori National Monuments.

APPENDIX B.

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HOT SPRINGS RESERVATION.

Dr. WM. P. PARKS, Superintendent, Hot Springs, Ark.

GENERAL STATEMENT.

This is my fourth annual report since assuming charge of the affairs of the Hot Springs Reservation, and it is gratifying to report a substantial increase in the business of the bathhouses and the number of visitors to this resort as compared with last year.

During the present fiscal year 704,975 paid baths were sold in the different pay bathhouses, as compared with 639,711 paid baths sold in the same bathhouses last year, which is a net gain of 65,264. The total receipts of these bathhouses this year were $332,791.12. Last year their total receipts were $302,505.06, making a net gain of $30,286.06. The net profits reported by these bathhouses this year were $127,911.74, and the net profits last year were $116,322.96, making an increase in net profits of $11,588.78. In addition to the paid baths above stated there were given 1,717 complimentary baths, 97,630 baths at the Government free bathhouse, and 4,503 baths at the Leo N. Levi Memorial Hospital bathhouse, which is a charitable institution, making a grand total, including paid baths, of 808,825 baths given during the year, an increase of 59,163 over last year.

It is estimated that 140,000 persons visited Hot Springs during the past fiscal year. Included in this number were the delegates and visitors to four of the most representative conventions of this country—the General Federation of Women's Clubs, the Southern Baptist Convention, the executive council of the American Bankers' Association, and the National Editorial Association. No more distinguished and representative bodies of people were ever entertained in this city.

This continued increase fully demonstrates the popularity of this health-pleasure resort, and a steady increase in patronage seems practically assured.

LEGENDARY HISTORY.

The hot springs were probably visited in 1541 by De Soto, who died the following spring on the Mississippi, about 100 miles away. According to traditions, the curative properties of the springs were known to the Indians long before the advent of the Spaniards. There is a tale that the various tribes battled from time to time for control of the hot waters, in which they believed the "Great Spirit" to be ever present, but that finally a truce was declared under which their benefits were extended to the sick of all tribes.

It is believed that the earliest white settlement was made about the year 1800. Dunbar and Hunter, who visited the place in December, 1804, found an open log cabin and a few huts built of split boards which had been erected by persons resorting to the springs in the hope of regaining their health. Manuel Prudhomme built a cabin there in 1807 and was joined in the same year by John Percifull and Isaac Cates.

RESERVATION.

Hot Springs Reservation, which now contains 911.63 acres, was set aside by the Government in 1832. It includes Hot Springs, North, West, and Sugar Loaf Mountains, and Whittington Lake Park. The hot springs issue forth at the foot of the west slope of Hot Springs Mountain. Their aggregate flow now under control is 851,308 gallons per day. The hot-water supply of the various bathhouses is derived from these springs, and all revenues collected therefrom are under the direction of the Secretary of the Interior, expended in the improvement, development, and beautification of the reservation, which is now coupled with the national parks throughout the United States, and administered by the Director of the National Park Service through the superintendent of the reservation, appointed by the Secretary of the Interior.

The superintendent has charge of all general matters connected with the Government's interests, is disbursing officer, enforces the rules and regulations of the department, has charge of sanitation, hydrotherapy, and bathing of patients at the Government free bathhouse for the indigent, and supervision of bath attendants and their fitness for employment.

CITY OF HOT SPRINGS.

Hot Springs is a beautiful city of 16,000 resident population, romantically situated in a spur of the Ozark Mountains. It enjoys all public utilities and metropolitan features of a city ten times its size. Its beautiful scenic environments make it particularly attractive to the visitor.

The city is now operated under a commission form of government, which consists of a mayor and four commissioners, elected by the people, and a city manager, elected by the commission. The city manager has entire charge of the city's business. This form of government has been in vogue for the past year, and it is believed it will prove satisfactory.

Unfortunately, the revenues of the city have been insufficient to make any extensive improvements, but it is believed that this obstacle will be overcome in the near future, as an occupation tax is now being considered which, if put into effect, will solve the problem of revenues. The commission is composed of substantial, progressive business men who have the best interests of the city at heart, and I am pleased to state that the city officials at all times work in harmony with this office in matters pertaining to the protection of the visiting public.

ADMINISTRATION.

The policy of strict enforcement of the rules and regulations governing the Hot Springs Reservation has been continued this year, with the result that there are now very few violations. In this matter I have had the hearty cooperation of all employees on the reservation. They have rendered efficient and conscientious service.

The system of records kept in the superintendent's office requires much work, in view of the fact that there is received daily a report from all bathhouses of the day's business. These reports are accompanied by the physicians' bathing directions and bath permits filed at each bathhouse, all of which are recorded and filed alphabetically.

A large number of persons visiting Hot Springs call at the superintendent's office for information, and it requires the greater part of the time of one person to attend to the requirements of the public in this respect.

The inspection of all bathhouses receiving hot water from this reservation, at least once a month, has been continued with good results, and the managers of the various bathhouses now appreciate this as an aid to them in maintaining a high standard of efficiency.

DRUMMING.

It is indeed gratifying to compare conditions as they exist now and as they existed two years ago. The work done last year has resulted in practically eliminating this nefarious and obnoxious practice. It is believed that if constant vigil is kept, the drumming evil can never again thrive in Hot Springs. In fact, it has been practically eliminated, so far as I can determine. Many of the older residents here wonder at the accomplishment of the downfall of the drumming system.

The splendid cooperation given this work by the department at Washington, as well as the cooperation of many of the local registered physicians, is highly appreciated. Visitors who have frequented this resort for years come into this office and comment upon the changed condition. All effort spent in this work is well repaid when taking into consideration the fact that visitors coming in search of health now go their way undisturbed and select their hotel and physician without being molested by a horde of drummers who never work, and whose only income was the commission they received as a result of taking the visitor to some physician who divided his fee with them.

With proper precaution and close watch in the future, I anticipate that the drumming practice will entirely disappear.

EMPLOYEES.

At the end of the fiscal year there were 28 employees, 2 less than the regular quota, engaged in the administration, maintenance, and protection of the Hot Springs Reservation, all of whom were appointed from Arkansas under civil-service rules.

Since my last annual report Richard L. Lawrence, manager of the free bathhouse, and John W. St. Clair, train inspector, have both received commissions in the first officers' training camp at Fort Logan H. Roots and are now in the National Army. James W. Walker, clerk stenographer, J. H. Demby, head attendant at the free bathhouse, and Philander H. Bump, Bishop H. Burrough, Hiram Walters, and Abraham Logan, laborers, have resigned, and Evelyn H. Moore, clerk stenographer, Adelbert X. Byers, head attendant at free bathhouse, Thomas J. Turner, Hugh McCollum, John R. Stinnett, and Rufus M. Moore, laborers, have been appointed.

The reservation force is composed of efficient and conscientious workers who try in every way to facilitate the work to be performed. There yet remains vacant two positions, which will be filled in due course.

The salaries of all employees receiving less than $1,200 per annum were increased 10 per cent and the salaries of all employees receiving more than $1,200 and less than $1,800 were increased 5 per cent, effective July 16, 1917.

RECEIPTS AND DISBURSEMENTS.

The receipts and disbursements on account of Hot Springs Reservation for the fiscal year ended June 30, 1918, were as follows:

Proceeds, sale of lots, special fund.

July 1, 1918, balance remaining to credit of fund of $82,518 derived from sale of Government lots		$4,972.49

Protection and improvement Hot Springs Reservation, indefinite (revenue fund).

July 1, 1917, balance to credit of revenue fund		$65,000.61
Receipts from July 1, 1917, to June 30, 1918, inclusive:		
Water rents	$28,780.00	
Ground rent	100.00	
Sale of attendant's badges	3.44	
Total receipts		28,883.44
Total available		93,884.05
Disbursements:		
Salaries of superintendent and reservation employees	$25,357.93	
Improvements, repairs, incidentals, and miscellaneous supplies—		
Paid by superintendent on pay rolls	106.37	
Vouchers approved by superintendent and forwarded to the department for payment	6,158.11	
Expended by superintendent	31,622.41	
Employment of a landscape engineer and other expenses required for the preparation of a practical and comprehensive plan, together with an accurate estimate of the cost thereof, for improving the Hot Springs Reservation	9,800.00	
Additional expended by the department	1,418.80	
	42,841.21	
Disallowed by auditor	19.19	
Total disbursements		42,822.02
Available balance July 1, 1918		51,062.03

No ground rent was collected from the Arlington Hotel.

IMPROVEMENTS AND MAINTENANCE.

No extensive improvements have been attempted during the year, as it was deemed best to concentrate all effort on the new plans being prepared by the architects for the improvement and beautification of the reservation on an extensive scale. These plans have been fully completed, together with estimates of cost approximating $2,000,000, and submitted to the National Park Service.

During the year a great deal of work has been done in maintaining the mountain roads and driveways on the reservation, on which 673 yards of gravel have been hauled and distributed. The work of maintenance and repairs, which includes the cultivation and care of trees, flowers, shrubbery, grass, and lawns, has occupied much of the time of the regular force of laborers.

In addition to the regular routine work, a new galvanized-iron pipe line of 2,900 linear feet has been installed in Whittington Lake Park to provide for sprinkling. The old pipe had become defective and was no longer serviceable. A brick garage, 21 feet 6 inches by 24 feet 3 inches, with stucco outside finish and tile roof, has been constructed at the superintendent's official residence. This was a much-needed improvement, as no outbuildings of any character were provided when the official residence was constructed. It is ornamental in design and presents an attractive appearance. In architectural design it has been made to conform with the official residence.

During the year a large quantity of fallen timber on the reservation was cut into cordwood and used at the Government free bathhouse, the superintendent's office, and the superintendent's official residence, thereby reducing the purchase and consumption of gas and coal to a large extent.

During the month of October a quantity of winter grass seed was sown and coated over with new soil on that part of the reservation front cared for by the reservation employees. The bathhouse owners on the reservation secured and planted the same kind of grass seed, with the result that during the months when the influx of visitors was greatest the lawns presented a uniform and pleasing appearance.

All water-pipe lines have been kept in good condition and the sewer line along the reservation front has been repaired. A line of large drain tiling has been relaid in Whittington Lake Park.

The reservation has been maintained in such a manner as to present at all times an attractive appearance to the eye of the visitor.

GOVERNMENT FREE BATHHOUSE.

The Government free bathhouse has been operated during the past year for the indigent in accordance with the acts of Congress of December 16, 1878, and March 2, 1911, with the following results:

Total applications for free baths	4,893
Number refused	159
Tickets issued to—	
White males	2,373
White females	351
Colored males	1,159
Colored females	851
Total tickets issued on original applications	4,734
Tickets reissued to—	
White males	1,466
White females	244
Colored males	632
Colored females	251
Total tickets reissued	2,593
Total tickets to—	
White males	3,839
White females	595
Colored males	1,791
Colored females	1,102
Total tickets, including reissues	7,327
Baths given to—	
White males	52,437
White females	8,205
Colored males	22,981
Colored females	14,007
Total number baths given	97,630

Average number baths given daily, 320+.

From the above table it is noted that the decrease from last year in the number of baths given is 3,625. Strict enforcement has been observed with reference to the act of Congress which prohibits persons from bathing at the Government free bathhouse who are able to pay for the baths, and a decrease from year to year has resulted.

For many years the Government free bathhouse has been a boon to suffering humanity, and its passing will come with the erection of the new administration building and free bathhouse, with a clinic on the second story, which is now provided for. The old free bathhouse will long be remembered for the good it has done, and will be a feature in the history of Hot Springs. The space it now occupies is included in the new plan of development and beautification of the reservation, but this particular space will probably never lose its identity.

The new bathhouse and clinic will be substantial, modern, and complete in every detail, thus affording the indigent sick and afflicted who come seeking health baths and medical treatment with the best of facilities.

FREE CLINIC.

Notwithstanding the disadvantages and inconveniences on account of inadequate quarters and laboratory facilities, the clinic which is operated in the rooms over the Government free bathhouse has been continued during the fiscal year ended June 30, 1918. The physicians engaged in this work are registered and give a portion of their time between the hours of 1 and 3 p. m. each day except Sundays and legal holidays. The only persons treated here are the indigent free bathers who are unable to secure funds with which to pay for treatment.

The Wasserman and different diagnostic tests were made in connection with these cases.

A report from the G. U. clinic states that in all there were treated 258 cases, with the following results:

No results, due to insufficient treatment	[illegible]
Slight improvement	47
Much improvement	61
Cured	[illegible]

The daily average in the various months was from 10 to 26; mean average, 18. The approximate number of personal treatments given was 5.700, and the total number of cases of disease 324. The following diseases were treated in the G. U. clinic:

Gonorrhea, acute and chronic; cystitis; urethral stricture; prostatic hypertrophy rheumatism, gonococcal; abscess, periurethral; epididymitis, gon.; prostatic calculi, fistula, urinary; phimosis.

The skin-syphilis clinic has not been operated continuously on account of insufficient laboratory facilities necessary for diagnostic purposes. It has, however, been operated for the past five months, and such tests as were required were made in the laboratories of the physicians in charge. There were treated in this clinic 115 cases. These cases were treated for the following diseases:

Eczema; blastomycosis; iritis, luetic; chancroid; syphilis (primary, secondary, and tertiary).

In connection with this report I believe it is not out of place to note some observations taken from investigations made at the clinic and from reports made by some of the different physicians of the city. These studies have been confined chiefly to the physiological action of the hot waters, and have yielded some very significant information.

1. *Effects of the baths on body temperature.*—The observations of the Hot Springs baths show that after a 10-minute immersion in the bath, the water of which is 98° F. (body temperature), the temperature of the body is found to be 1° to 2° higher than before entering the bath. Increasing the temperature to 100° does not materially increase the rise of the body temperature. Nor do the hot packs seem to cause any change in this direction. The greatest increase in the body temperature was noted after the vapor bath. This is administered by allowing a person to remain inclosed in a cabinet and inhale the vapor as it is liberated from the hot water. After remaining in this cabinet from three to five minutes the body temperature, which was normal before entering, has in all instances been observed to have been increased 3° to 5° F. This is a very important point for the reason that it demonstrates that a temporary fever, which is a conservation mechanism on the part of the body to ward off infection or intoxication, can be artificially produced by the baths.

2. *Effect of the baths on the blood picture.*—The blood in most infectious diseases shows an increase in one of its elements, the leucocytes, whose function, it is believed, is to ingest and destroy bacteria and poisons. Blood examinations made before and after the baths showed a marked increase in these cells as a result of the baths.

3. *Effects of the baths on the polynuclear cells of the blood.*—These polynuclear cells of the blood are the bodies which in infectious diseases and intoxication are increased more than any other of the white blood cells. They are generally conceded to be the protective barrier which the body forms to prevent the extension of infection. Counts of the polynuclear cells show that they were increased as high as 10 per cent above the number found before the baths.

4. *Effect of the baths on the phagocytic power of the blood.*—The power which the blood possessses for destroying bacteria is termed the phagocytic power, and the cells which ingest the bacteria are called phagocytes. The phagocytic power of the blood may be determined by mixing fresh blood from a patient with a fresh culture of bacteria, and after incubating the mixture for a certain time the blood is examined and the number of bacteria taken up by each phagocyte counted. It was found by making investigation of this kind before and after the baths that the number of bacteria taken up by the phagocytes was greater in most cases after the bath than before.

From the above facts, which are based on the study of a great many cases, we arrive at this conclusion: That the benefits which seem to accrue from the natural thermal waters of the Hot Springs are due in all probability to their action on metabolism and elimination, and the medical conditions most benefited are those in which the disturbance is due to a toxemia, either of bacterial or metabolic origin. Upon the physiological findings of the hot water the physician is as well equipped to prescribe the waters as intelligently in such ailments as are benefited by them as he would be to prescribe a drug whose physiological action and therapeutic value are known to him.

When the new free bathhouse shall have been completed and the clinic equipped with up-to-date laboratories with a technician in charge we then can give better service to the indigent and make more complete and thorough investigations of the water with reference to its value in the treatment of different diseases and its relative value in each disease.

PAY BATHHOUSES.

There are at the present time 19 pay bathhouses in Hot Springs receiving hot water from the Hot Springs Reservation, with the following rates for baths, fixed in each instance by the Secretary of the Interior, in effect therein:

Bathhouse.	Single bath.	Course of 21 baths.	Bathhouse.	Single bath.	Course of 21 baths.
Alhambra	$0.40	$7.00	Maurice	$0.60	$11.00
Arlington	.65	12.00	Moody	.50	9.00
Buckstaff	.60	11.00	Ozark	.40	7.00
Eastman	.55	10.00	Ozark Sanitorium	.45	8.00
Fordyce	.65	12.00	Pythian (colored)	.30	5.00
Hale	.50	9.00	Rector	.45	8.00
Imperial	.55	10.00	Rockafellow	.45	8.00
Lamar	.45	8.00	Superior	.50	9.00
Magnesia	.40	7.00	St. Joseph's Infirmary	.50	9.00
Majestic	.55	10.00			

In addition to the above there is a uniform attendant's fee, also fixed by the Secretary of the Interior, of 15 cents for a single bath, or $3 per course of 21 baths, which is collected by the bathhouse manager and properly accounted for to the attendant. On October 7, 1918, these rates were changed by the department to 20 cents and $4, respectively.

All bathhouses sell half-rate tickets for 10 baths, and some of the bathhouses sell quarter tickets for 5 baths, at one-half and one-fourth, respectively, of the rates shown above for a full course of 21 baths.

There are at present 24 hot-water and ground leases in force, as shown in the following table:

Hot-water and ground leases.

Name of bathhouse, etc.	Lessee.	Tubs.	Date of lease.	Expiration.
Alhambra	Alhambra Bathhouse Co	18	Mar. 1, 1916	Feb. 28, 1919
Arlington [1]	Arlington Hotel Co	68	Mar. 21, 1914	Mar. 3, 1932
Buckstaff	Buckstaff Bathhouse Co	31	Jan. 1, 1912	Dec. 31, 1931
Eastman [1]	New York Hotel Co	64	May 13, 1912	May 12, 1932
Fordyce	S. W. Fordyce, jr., trustee	30	Jan. 1, 1915	Dec. 31, 1934
Hale	Mercantile Trust Co., trustee	25	do	Do.
Horseshoe [3]	D. Fellows Pratt	30	Jan. 1, 1895	Dec. 31, 1909
Imperial	Chas. N. Rix	27	Jan. 1, 1912	Dec. 31, 1931
Lamar [2]	M. C. Tombler and G. H. Buckstaff.	30	Jan. 1, 1897	Dec. 31, 1916
Levi Memorial	Leo N. Levi Memorial Hospital Association.	5	Nov. 1, 1914	Oct. 31, 1924
Magnesia [3]	Chas. B. Platt	30	Jan. 1, 1895	Dec. 31, 1909
Majestic [1]	Avenue Hotel Co	23	Jan. 1, 1913	Dec. 31, 1932
Maurice	Maurice Bath Co	29	Jan. 1, 1912	Dec. 31, 1931
Moody [1]	Nicholas N. Moody	16	July 1, 1910	June 30, 1920
Ozark [3]	W. S. Sorrells and F. B. Latta	26	Jan. 1, 1904	Dec. 31, 1913
Ozark Sanitorium	Ozark Sanitorium Co	10	Sept. 17, 1912	Sept. 16, 1922
Park [1] [4]	Garland Hotel Co	47	May 13, 1912	May 12, 1932
Pythian (colored)	Knights of Pythias (colored)	10	Dec. 16, 1914	Dec. 15, 1924
Rector	Elias W. Rector estate	12	Apr. 16, 1914	Apr. 15, 1924
Rockafellow	Mahala J. Rockafellow	18	July 1, 1916	June 30, 1918
St. Joseph's Infirmary [1]	Sister Superior	10	Feb. 1, 1914	Jan. 31, 1924
Superior	Superior Bathhouse Co	20	Feb. 15, 1916	Feb. 14, 1936
Arlington Hotel, ground lease	Arlington Hotel Co		Mar. 21, 1914	Mar. 3, 1932
Hot Springs Mountain Observatory, ground lease.	Hot Springs Mountain Observatory Co.		Sept. 1, 1913	Sept. 1, 1923

[1] Water used in private bathrooms in portion of tubs leased.

[2] Closed Dec. 31, 1915.

[3] Tenants holding over.

[4] Destroyed by fire Sept. 5, 1913.

Hot Springs can claim the distinction of having the finest bathhouses in the world. There is no doubt of this, for visitors who have visited the great health resorts of Europe frequently come here, and they all appear to concede this point.

The plans and specifications for rebuilding new and modern bathhouses on the sites formerly occupied by the Horseshoe, Magnesia, Ozark, and Lamar bathhouses have been finally approved by the Service, and these will be constructed as soon as practicable or directed by the department in order to secure a renewal of their leases, all of which have expired some time since.

Good service at all the bathhouses is maintained by reason of frequent inspection, each bathhouse receiving water from the Hot Springs Reservation being inspected at least once each month. The bathhouse managers have cooperated with this office in the enforcement of the rules and regulations, which has redounded to the benefit of patrons.

The places vacated by attendants being called away by the draft have been filled by persons who are rendering satisfactory service.

The business of the bathhouses has been excellent, and shows a material increase over previous years both in total receipts and net profits. The following tables showing the business of the bathhouses during the past fiscal year have been compiled from their monthly and annual reports submitted to this office:

Total receipts, less redemptions, of bathhouses, by months, for the fiscal year ended June 30, 1918.

Bathhouse.	July.	August.	September.	October.	November.	December.	January.
Alhambra	$821.60	$825.05	$757.05	$728.35	$664.65	$406.05	$933.70
Arlington	1,089.55	1,023.90	1,442.55	1,614.05	1,994.15	1,798.45	3,168.90
Buckstaff	1,607.60	2,670.40	1,502.10	1,511.10	1,570.15	1,846.05	3,120.15
Eastman	....	....	....	....	....	....	815.25
Fordyce	2,649.81	2,876.55	1,744.52	1,820.82	1,820.57	2,543.19	4,832.23
Hale	1,397.45	1,471.00	1,323.60	948.85	1,294.00	1,634.50	2,139.90
Imperial	1,259.75	1,156.50	1,147.55	1,002.05	993.50	918.60	1,671.50
Lamar	1,359.80	1,224.85	951.60	931.80	1,110.55	910.40	1,400.95
Magnesia	1,079.40	1,338.05	1,023.35	944.40	1,315.85	1,362.80	1,559.65
Majestic	1,228.40	1,757.35	819.25	952.45	972.85	1,028.75	1,770.20
Maurice	2,202.85	2,733.05	2,111.45	2,289.85	2,349.90	2,560.35	5,381.15
Moody	477.65	543.51	290.46	324.40	354.26	406.60	780.64
Ozark	1,403.85	1,584.40	1,673.75	1,363.05	1,626.75	1,219.30	1,927.30
Ozark Sanitorium	500.00	276.90	318.10	419.10	355.45	393.45	479.20
Pythian (colored)	408.20	501.05	405.20	219.80	164.50	253.65	448.40
Rector	450.30	444.85	357.65	385.40	285.85	209.95	359.65
Rockafellow	1,230.16	1,299.55	873.59	730.71	812.35	828.19	1,353.45
St. Joseph's Infirmary	303.07	178.05	270.52	278.10	290.00	262.07	409.00
Superior	1,323.15	1,247.80	1,148.00	703.25	932.05	941.90	1,584.10
Total	20,792.59	23,152.81	18,160.29	17,167.53	18,907.38	19,524.25	34,135.22

Bathhouse.	February.	March.	April.	May.	June.	Total.
Alhambra	$958.25	$1,202.05	$1,027.80	$1,192.55	$1,053.30	$10,570.40
Arlington	4,646.20	3,875.65	3,163.40	2,145.45	1,531.00	26,898.35
Buckstaff	3,893.80	3,792.35	2,374.35	3,013.70	1,477.45	28,379.20
Eastman	3,326.70	3,405.65	752.65	848.95	....	9,149.20
Fordyce	5,560.62	5,448.17	3,479.19	4,004.88	2,834.32	39,614.87
Hale	2,559.70	3,017.90	2,187.75	1,828.60	1,392.85	21,196.00
Imperial	2,350.55	2,446.85	2,042.50	1,834.45	1,571.10	18,394.90
Lamar	1,769.80	1,852.05	1,669.70	1,675.50	1,345.15	16,202.15
Magnesia	1,640.35	1,856.70	1,467.50	1,482.10	1,229.00	16,299.15
Majestic	2,552.25	2,717.35	1,714.70	1,453.70	1,191.45	18,158.70
Maurice	7,009.15	6,027.35	4,279.75	3,837.20	2,946.95	43,729.00
Moody	1,225.18	1,156.18	703.48	558.12	615.15	7,435.63
Ozark	2,172.75	2,738.20	2,216.55	2,208.35	1,650.30	20,784.55
Ozark Sanitorium	574.35	793.25	583.25	623.72	476.65	5,793.42
Pythian (colored)	672.81	1,056.31	594.05	620.30	459.03	5,803.30
Rector	690.25	715.65	331.30	526.20	421.25	5,178.30
Rockafellow	1,484.49	2,119.00	1,506.94	1,617.39	1,456.80	15,312.62
St. Joseph's Infirmary	699.07	631.50	600.50	359.20	355.50	4,636.58
Superior	2,004.80	2,369.15	2,297.85	2,228.70	1,479.15	18,259.90
Total	45,191.07	47,221.31	32,993.21	32,059.06	23,486.40	332,791.12

Business of the bathhouses for the fiscal year ended June 30, 1918.

Bathhouse.	Whole tickets.	Half tickets.	Quarter tickets.	Single tickets.	Total baths sold.	Baths redeemed.	Net paid baths.
Alhambra	1,189	715	62	2,042	34,471	3,444	31,027
Arlington	1,361	1,676	....	3,774	49,115	7,418	41,697
Buckstaff	1,754	1,221	874	3,286	56,700	7,147	49,553
Eastman	451	813	....	2,766	20,367	2,787	17,580
Fordyce	2,192	1,337	966	4,071	68,303	10,766	57,537
Hale	1,784	1,389	....	2,428	53,782	6,287	47,495
Imperial	1,304	900	611	1,587	41,005	4,065	36,940
Lamar	1,247	1,324	630	1,403	43,980	3,912	40,068
Magnesia	1,959	1,048	286	1,862	54,911	7,395	47,516
Majestic	1,612	1,045	....	1,240	45,542	8,699	36,843
Maurice	2,876	1,603	1,042	2,416	84,052	9,125	74,927
Moody	583	521	3	971	18,454	1,884	16,570
Ozark	2,465	1,768	1,004	2,809	77,274	12,969	64,305
Ozark Sanitorium	519	486	....	958	16,717	1,990	14,727
Pythian (colored)	793	748	255	1,505	26,913	2,080	24,833
Rector	481	336	188	750	15,151	1,818	13,333
Rockafellow	1,373	1,128	....	1,387	41,500	3,414	38,086
St. Joseph's Infirmary	441	217	....	63	11,494	791	10,703
Superior	1,534	981	697	1,481	46.499	5,264	41,235
Total	25.918	19,256	6,618	36,799	806,230	101,255	704,975

Business of the bathhouses for the fiscal year ended June 30, 1918—Continued.

Bathhouse.	Complimentary baths.	Paid for redeemed baths.	Total bath receipts less redemptions.	Receipts from massage, etc.	Total receipts.	Total expenditures.	Net profits.
Alhambra	115	$1,205.40	$10,545.40	$25.00	$10,570.40	$10,017.60	$552.80
Arlington	25	4,347.85	24,493.25	2,400.00	26,893.25	11,060.00	15,833.25
Buckstaff	150	3,930.80	26,453.80	1,925.40	28,379.20	20,658.77	7,720.43
Eastman	....	1,347.10	8,749.20	400.00	9,149.20	4,630.00	4,519.20
Fordyce	295	6,459.52	33,410.63	6,204.24	39,614.87	23,011.28	16,603.59
Hale	88	2,829.15	20,691.35	504.65	21,196.00	12,922.00	8,274.00
Imperial	21	2,032.10	17,898.25	496.65	18,394.90	13,135.95	5,258.95
Lamar	27	1,564.70	15,598.65	603.50	16,202.15	9,442.25	6,759.90
Magnesia	169	2,588.25	16,038.05	261.10	16,299.15	9,042.05	7,257.10
Majestic	44	4,168.30	17,858.70	300.00	18,158.70	11,617.02	6,541.68
Maurice	21	5,018.65	39,748.95	3,980.05	43,728.00	25,445.53	18,283.47
Moody	....	791.57	7,292.18	143.45	7,435.63	4,594.41	2,841.22
Ozark	217	4,539.05	21,784.55	....	21,784.55	9,892.10	11,892.45
Ozark Sanatorium	....	796.00	5,723.10	70.32	5,793.42	4,066.98	1,726.44
Pythian (colored)	....	581.65	4,966.55	836.75	5,803.30	3,606.74	2,196.56
Rector	54	727.20	5,178.30	....	5,178.30	4,551.10	627.20
Rockafellow	....	1,365.65	14,754.50	558.12	15,312.62	11,436 90	3,875.72
St. Joseph's Infirmary	....	340.42	4,636.58	....	4,636.58	2,392.58	2,244.00
Superior	491	2,371.85	17,945.90	314.00	18,259.90	13,356.12	4,903.78
Total	1,717	47,005.21	313,767.89	19,023.23	332,791.12	204,879.38	127,911.74

Fees received by bath attendants in the bathhouses for the fiscal year ended June 30, 1918.

Bathhouse.	Gross amount.	Redemptions.	Net amount.
Alhambra	$4,992.30	$516.60	$4,475.70
Arlington	7,163.10	1,112.70	6,050.40
Buckstaff	8,241.90	1,072.05	7,169.85
Eastman	2,987.40	418.05	2,569.35
Fordyce	10,184.05	1,748.85	8,435.20
Hale	7,799.70	943.05	6,856.65
Imperial	5,958.30	612.15	5,346.15
Lamar	6,409.95	586.80	5,823.15
Magnesia	7,942.80	1,109.25	6.833.55
Majestic	6,589.50	1,261.35	5,328.15
Maurice	12,176.40	1,368.75	10,807.65
Moody	2,683.65	282.60	2,401.05
Ozark	11,241.35	1,945.35	9,296.00
Ozark Sanatorium	2,429.70	298.50	2,131.20
Pythian (colored)	3,918.00	312.00	3,606.00
Rector	2,200.50	272.70	1,927.80
Rockafellow	6,019.05	512.10	5,506.95
St. Joseph's Infirmary	1,657.95	118.65	1,539.30
Superior	6,818.40	789.60	6,028.80
Total	117,414.00	15,281.10	102,132.90

RECOMMENDATIONS.

As a result of the appropriation of $10,000 from the revenues of the reservation, authorized by Congress in the sundry civil act approved June 12, 1917, and the employment under this act of Mann & Stern, architects, the new plans for the development, improvement, and beautification of the reservation have been completed and submitted to the National Park Service. These plans were shipped to Hot Springs and were on exhibit in the main parlor of the Eastman Hotel during the meeting of the General Federation of Women's Clubs, which was held here April 30 to May 8, 1918, and remained there during the sessions of the Southern Baptist Convention and the executive council of the American Bankers' Association, after which they were removed to the Arlington Hotel and placed on exhibit in the main parlor during the convention of the National Editorial Association. Shortly afterwards they were returned to Washington. These plans have been the subject of much favorable comment.

This office cooperated with the architects while the plans were being developed, and all improvments heretofore recommended by me have been included in them, namely:

The construction of a roadway, at least 30 feet wide and 2½ miles in length, through the "Gorge," at the east end of Hot Springs and North Mountains; the paving of Fountain Street from Central Avenue to boundary monument No. 36, and Reserve Avenue from Central Avenue to boundary monument No. 26, this work to be done in such a manner as to provide that the property owners on the opposite side of these streets from the reservation bear their just share of the expense; the construction of a new free bathhouse and clinic; the construction of a storm sewer and surface drainage system in Hot

Springs to care for the drainage from the reservation, and the construction of a sanitary sewer system in Hot Springs to care for the sewerage from the reservation; the construction of a new main entrance to Hot Springs Reservation from the promenade in front of Bathhouse Row in keeping with other contemplated improvements on an elaborate and extensive scale, in connection with a band pavilion of architectural design to correspond, in order to provide band music as a permanent feature of entertainment, and a drinking pavilion of such architectural design and construction as will make it a leading feature of this resort; also modern comfort stations located at such points on the reservation as may be deemed advantageous for this purpose; and the construction of a new greenhouse.

After careful study and consideration of the situation by the architects, it was deemed advisable to combine the administration building and free bathhouse, and locate same at the corner of Central and Reserve Avenues, on the site now occupied by the superintendent's office. In addition to this site it has been necessary to reduce the frontage of the Lamar-bathhouse site 25 feet on the south side in order to provide the necessary space. The plans contemplate the entrance to the administrative offices on Central Avenue, while the entrance to the free bathhouse will be on Reserve Avenue. I am highly gratified to report that an appropriation of $190,000, $50,000 of which came from the revenues of the reservation, has been made by Congress for the construction of this building, and work will be commenced thereon as soon as practicable.

With this splendid beginning, it is believed that the entire plan of improvement, as outlined by the architects, will be consummated within a reasonable length of time, and I strongly recommend that as soon as practicable estimates be submitted to Congress to provide for appropriation necessary to carry on this work in accordance with the recommendations and estimated costs submitted by the architects, as follows, except the administration building, clinic, and free bathhouse, for which provision has already been made:

Summary of costs.

Government building, administration building, clinic, and bathhouse	$149,962
Strengthening impounding reservoir	3,500
Two comfort stations on Bathhouse Row, at $13,534	27,068
Two comfort stations on each North, West, and Hot Springs Mountains and Whittington Lake Park, at $2,763	22,104
Main entrance and conservatory	169,500
Concert garden scheme	212,633
Upper garden	122,926
Home for indigents	160,000
Whittington Lake Park	207,021
Major Hallock spring	2,600
Two gateways near Government building	2,400
Secondary entrance	4,500
New gorge road and bridges	212,500
Widening and surfacing mountain roads	90,000
Surfaced connecting roads	17,200
Sanitary sewers without purification plant	28,250
Drainage system as originally suggested in J. W. Barnett's report	458,500
Street improvements	36,400
New impounding reservoir	40,000
Cleansing system for reservoirs	14,750
Total	1,971,816

If Arkansas marble is used instead of limestone for facing the Government building add $30,038.

If bridges 12 feet wide are used on the gorge road instead of 20 feet, deduct $17,000.

If penetration method of asphalt macadam roadway surface is used instead of sheet asphalt for the gorge road, deduct $21,000.

If 2,500,000-gallon capacity purification plant is included, with sanitary sewer system add $98,000.

If a Nuhoff tank, as described in Mr. Barnett's report, is used with the sanitary sewer system, add $30,000.

If storm sewer system is built with relief sewer instead of tunnel, deduct $257,500.

If storm sewer system is built with reduced size tunnel, as outlined in Ford & McCrea's report, deduct $133,500.

If tunnel is used for storm sewer system and concrete lining is omitted, deduct $50,000.

NOTE.—Since the above estimates were made there has been a great increase in the costs of material and labor, which will necessarily have to be considered in connection with the above estimates. Such consideration was had in connection with the appropriation for the administration building and free bathhouse.

I renew my recommendation that, if consistent, the rules and regulations governing the Hot Springs Reservation be revised as soon as practicable, as set forth in my letters of May 7 and November 26, 1917.

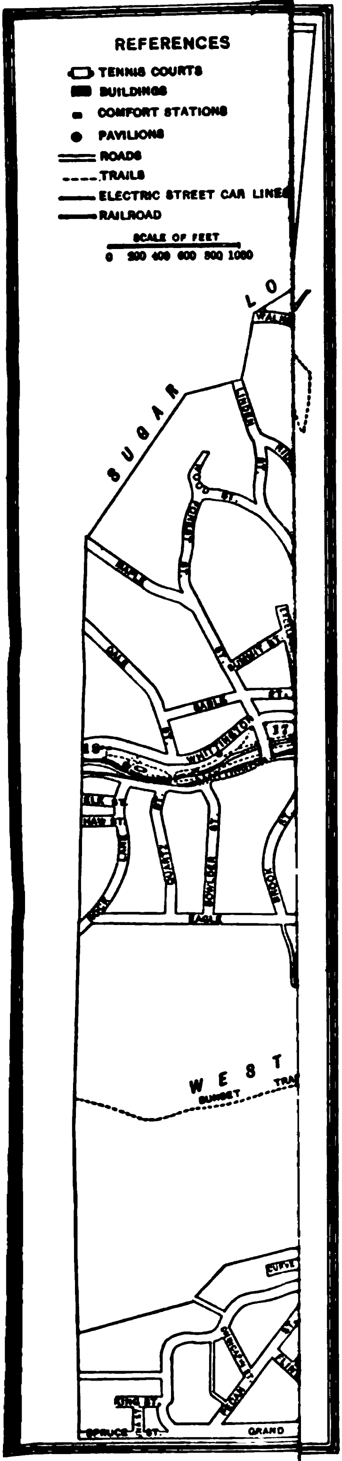
This will provide a substantial increase in the revenues of the reservation, which can be used to advantage in its improvement and beautification.

CONCLUSION.

From my experience and close observation during the past four years, I am firmly convinced that Hot Springs is destined to continue to grow in popularity as a health-pleasure resort and eventually stand out ahead of all others in popularity with the public, as these health-giving waters are undoubtedly a great factor in the promotion of the health of the Nation. Through the efforts of the National Park Service, under whose direction the reservation is operated, it is becoming better known throughout the country, and the continuation of the policy of education adopted by the service with reference to the national parks will result in great benefit to Hot Springs.

I feel sanguine in stating that after the war is over this resort will be filled to overflowing with health and pleasure seekers, and additional modern, commodious, and attractive hotel facilities will be necessary to care for the increased patronage.

NATIONAL PARK SERVICE. IX.



LEGEND.

The numbers in this list refer to the numbers on the map:

1. Superintendent's office.
2. Lamar bathhouse.
3. Buckstaff baths.
4. Ozark bathhouse.
5. Magnesia bathhouse.
6. Government free bathhouse.
7. Fordyce bathhouse.
8. Main entrance to reservation.
9. Maurice bathhouse.
10. Hale bathouse.
11. Superior bathhouse.
12. Arlington Hotel and baths.
13. Superintendent's residence (old).
14. Rockafellow Hotel and baths.
15. Majestic Hotel and baths.
16. St. Joseph's Infirmary and baths.
17. Whittington Lake Park.
18. Keeper's residence.
19. First Presbyterian Church.
20. Catholic Church.
21. Rector bathhouse and Waukesha Hotel.
22. Milwaukee Hotel.
23. Pullman Hotel.
24. Arkansas National Bank.
25. Masonic Temple.
26. First Baptist Church.
27. Leo N. Levi Memorial Hospital and bathhouse.
28. Goddard Hotel.
29. Alhambra bathhouse.
30. Moody Hotel and baths.
31. Court House.
32. Como Hotel.
33. Central Methodist Church.
34. High School Building.
35. Ozark Sanitorium bathhouse.
36. Missouri-Pacific Depot.
37. Rock Island Depot.
38. City Hall and Auditorium Theatre.
39. Business Men's League.
40. Post Office.
41. Great Northern Hotel.
42. Citizens' National Bank.
43. Marquette Hotel.
44. Arkansas Trust Company.
45. Security Bank.
46. Eastman Hotel and baths.
47. Elks' Club.
48. Episcopal Church.
49. Superintendent's residence (new).
50. Imperial bathhouse.
51. Pump house (pumps water to drinking fountains at summit of Hot Springs Mountain).
52. Tower.
53. Iron Spring (cold).
54. Dugan-Stuart Building.
55. Thompson Building.

North, West, and Hot Springs Mountains and Whittington Lake Park form the permanent Hot Springs Reservation, owned and operated by the Government.

YELLOWSTONE NATIONAL PARK.

CHESTER A. LINDSLEY, Acting Superintendent, Yellowstone Park, Wyo.

GENERAL STATEMENT.

The Yellowstone National Park was set aside by act of Congress approved March 1, 1872 (secs. 2474 and 2475, R. S.; 17 Stat., 32), as a pleasure ground for the benefit and enjoyment of the people and placed under the control of the Secretary of the Interior. It is situated principally in northwestern Wyoming but laps over a little more than 2 miles into Montana on the north and almost 2 miles into Montana and Idaho on the west. Its dimensions are about 62 miles north and south and about 54 miles east and west, giving an area of about 3,348 square miles, or 2,142,720 acres. Its altitude is 6,000 to 11,000 feet.

During the first 14 years of its existence as a national park the Yellowstone was administered by civilian superintendents appointed by the Secretary of the Interior, assisted, when funds were available for salaries, by a few civilian scouts. At that time the country was new and wild and filled with lawless characters of all sorts. This method of governing the park was sometimes unsatisfactory, for the reason that funds were insufficient to employ enough scouts to properly police the vast area to be protected, and I understand that in some instances the employees were selected for political reasons without reference to their adaptability for the duties required. By act of Congress approved March 3, 1883, the Secretary of the Interior was authorized to call upon the Secretary of War to make the necessary details of troops to guard the park, but it was not until August 20, 1886, that the civilian force was finally relieved by officers and enlisted men of the United States Army as guardians of the park, the commanding officer of troops serving also in the capacity of acting superintendent of the park under the direct supervision of the Secretary of the Interior.

Many most efficient and able officers of the Army have held the responsible position at the head of the administration and protection of Yellowstone Park, and records were established of which they may well be proud. But conditions have changed, and the national parks have grown in number and popularity to such an extent as to warrant the establishment by Congress of a regular bureau in Washington for their administration and management under modern business methods, and this bureau has been recognized as the natural and proper medium through which all park activities are to be prosecuted by the act of Congress approved July 1, 1918 (sundry civil bill), which provides the total sum of $334,920 for administration, protection, maintenance, and improvements in Yellowstone National Park. Under this act the Corps of Engineers of the Army was, on July 1, relieved of the duties of building and maintaining roads, bridges, and other improvements. The responsibility of the protection of the park has been taken over from the commanding officer of troops, the stations in the park have been garrisoned by civilian rangers, and orders are expected daily for the permanent abandonment of Fort Yellowstone, releasing the troops which are needed by the War Department for important work elsewhere.

Park headquarters are located at Mammoth Hot Springs, 5 miles from the northern entrance. Fifteen ranger stations are maintained at convenient points throughout the park, and these are connected with headquarters by 270 miles of telephone lines. There are 278.8 miles of main road and 24.75 miles of secondary road to maintain inside of the park, and 106.5 miles of main road to maintain in the forest reserves adjoining the park on the south and east. Nearly 400 miles of fairly well marked trails are also available for use of those desiring to travel on horseback.

TRAVEL.

Before the opening of the tourist season, much doubt existed as to the probable effect of the war conditions on tourist travel to the national parks, and many, more especially the concessioners, were very pessimistic as to the prospects. In March it was officially announced through the press that the Yellowstone Park tourist season would extend from June 25 to September 15. From March until the season finally opened, many rumors were current to the effect that the park would not open due to war conditions, and these had to be contradicted many times. It was not until June 17 that I was notified by wire that the hotels would not open, and this information going out through the press and by various other methods was often interpreted to mean that the park was closed, and doubtless resulted in travel being discouraged to a considerable extent. The lateness of this announcement resulted to some extent in hardship to other concessioners, but the camping company profited by the change, as it left to it all travel except those providing their own camping facilities, instead of dividing it with the hotels. This enabled the camping company to make a fair showing and operate at a reasonable profit, whereas if the hotels had also been opened, both would have operated at a loss.

The latter part of May and early in June the weather was much warmer than usual, and in June 2.97 inches of rainfall was recorded, which was about one-third more than the normal for June. These conditions, taken together, resulted in extremely high water, with an immense amount of damage to roads from washouts. The railroad on the park branch to Livingston was washed out in several places so we had no train into Gardiner from June 12 to June 21, inclusive, and it was not until June 19 that arrangements were finally made to bring the mail from Livingston by automobile. The road through Gardiner Canyon was washed out so as to be impassable after June 10, and the old road over the hill back of Mammoth Hotel, which was repaired at an expense of about $4,000, has been in use ever since. This was no special disappointment, however, as we had expected the Gardiner slide to close the canyon road permanently, and the old road had been put in condition for travel with this in view. The old road is longer, narrow, and very slippery after heavy rains, but it is considered only for temporary use until the Gardiner Canyon road can be restored, and an appropriation of $50,000 is now available for that purpose. One-way schedules were necessary on it about train time, when travel was heaviest, and while no serious accidents occurred, much inconvenience was caused by meeting of vehicles on this road.

The roads to Norris and the west side of the park were open at the end of May.

On the day of opening for tourist travel, the roads on the regular park tour were open for travel except from the eastern entrance to the belt line and between Canyon and Tower Falls through Dunraven Pass. The regular travel was routed through Dunraven Pass beginning July 8, but on a few occasions during the season, when heavy storms have occurred, this road was not considered safe, and the regular cars came in via Norris. The road between the eastern entrance and Cody was very badly damaged by the June floods, and for a time the chances for travel from that direction looked dim. But the citizens of Cody did much temporary repair work at their own expense, and succeeded in getting a special appropriation of $25,000, in addition to the regular appropriation, for repairing the unusual damage between the Lake Hotel and Cody. A few private automobiles came in from the Cody entrance on July 2, but they had to be dragged with ropes across two huge snowbanks in Sylvan Pass, and it was not until July 1[illegible] that the road was considered safe for regular travel and the Yellowstone Park Transportation Co. established its regular daily schedule to trains at Cody.

The bridge across Lamar River, on the road between Tower Falls and Cooke City, was washed away on June 11, and from then until August 8 travel to Cooke was relayed from Lamar River, which was crossed in a small car hung on a wire cable.

The transportation company maintained a regular twice-a-week service to Jackson Hole, beginning July 15, but it was not patronized to any great extent.

The aggregate number of persons visiting the park during the year ended October 12, 1918, was as follows:

Yellowstone Park Transportation Co.:		
Entering via the northern entrance	1, 637	
Entering via the western entrance	1, 186	
Entering via the eastern entrance	253	
		[illegible]
Making park trips with private transportation:		
With autoomobiles, paid and complimentary	16, 619	
With automobiles; second trip	698	
	17, 317	
With motorcycles	25	
With bicyles	3	
With other transportation as "private camping parties"	474	
		17, [illegible]
Miscellaneous short trips		[illegible]
Grand total		21, [illegible]

As a matter of economy, the National Park Service required the camping company to open but three of its permanent camps, namely, Mammoth, Geysers (at Upper Basin) and Canyon, thus saving the expense of running the Lake Camp, the camp at Lost Creek, near Tower Falls, and the lunch station near the western entrance. This arrangement required a much less overhead expense, gave better assurance of a paying business at the beginning of a very doubtful season, and caused but very little, if any, dissatisfaction on the part of the tourists. Instead of staying one night at Lake Camp, the distance from Upper Basin to Canyon was covered in one afternoon's drive, leaving an extra day for viewing the more interesting phenomena at Upper Basin and Canyon. The camping company reports that 68,257 meals and 26,407 lodgings were furnished at the camps during the season:

Travel by different entrances.

From the north, via Gardiner, Mont	7, [illegible]
From the west, via Yellowstone, Mont	8, [illegible]
From the east, via Cody, Wyo	4, [illegible]
From the south, via Jackson, Wyo	[illegible]
From the northeast, via Cooke, Mont	[illegible]
Total	21, [illegible]

Private automobile travel.

	Automobiles.	Tourists.
Entering via the northern entrance	1,528	[illegible]
Entering via the western entrance	1,943	[illegible]
Entering via the eastern entrance	1,128	[illegible]
Entering via the southern entrance	135	[illegible]
Total	4,734	[illegible]

A fee of $7.50 was charged for automobile tickets of passage and $2.50 for motorcycle tickets of passage, which were good for the entire season. Complimentary tickets were issued to officials of adjoining States or counties and to officials of the Federal Government visiting the park officially.

AUTOMOBILE TRAVEL BY STATES.

A statement showing the automobile travel, by States, in Yellowstone National Park for the season of 1918 follows:

Private travel in Yellowstone National Park, by States, for the season of 1918.

	North entrance.	West entrance.	East entrance.	South entrance.	Total.
Alabama	....	3	....	....	3
Arkansas	....	12	22	....	34
Arizona	2	30	14	4	50
California	95	266	84	11	456
Colorado	66	137	291	9	502
Connecticut	2	2	6	....	10
District of Columbia	....	....	14	2	16
Delaware	3	....	....	....	3
Florida	....	3	30	....	33
Idaho	60	2,350	26	256	2,692
Illinois	64	41	47	....	152
Indiana	31	20	10	....	61
Iowa	119	58	56	2	235
Kansas	44	107	141	8	300
Kentucky	2	....	....	....	2
Louisiana	....	6	5	....	11
Massachusetts	5	2	....	....	7
Michigan	29	22	50	....	101
Minnesota	186	17	21	....	224
Mississippi	2	3	12	....	17
Missouri	26	56	122	2	206
Montana	3,071	1,606	390	4	5,070
Nebraska	78	95	356	....	529
Nevada	5	54	9	....	68
New Jersey	3	4	10	....	17
New Mexico	....	10	29	....	39
New York	24	21	14	2	61
North Dakota	276	34	31	....	341
Ohio	31	25	34	....	90
Oklahoma	14	58	170	....	242
Oregon	109	158	21	....	288
Pennsylvania	17	6	14	....	37
Rhode Island	2	....	....	....	2
South Dakota	111	10	91	4	216
Tennessee	....	3	8	....	11
Texas	18	54	91	....	163
Utah	68	1,637	35	114	1,854
Virginia	3	....	....	....	3
Washington	399	197	52	....	648
West Virginia	....	4	....	....	4
Wisconsin	103	27	13	....	143
Wyoming	180	147	1,668	95	2,091
Canada	50	10	3	6	60
Total	5,298	7,294	3,990	519	17,101
Unclassified	....	....	....	....	718
Unclassified (miscellaneous short trips)	....	....	....	....	430
Yellowstone Park Transportation Co	1,537	1,136	353	....	3,026
Total	....	....	....	....	21,275

All but a very small percentage of tourists visiting the park traveled by motor transportation. The total travel, as compared with that of the past three years, was small, but it was better than many anticipated at the beginning of the season, although the number coming to the park by rail was relatively small, due to the fact that the railroads rather discouraged travel for pleasure during the busy war times.

Camping shelters, wood, and toilet facilities were furnished free to parties touring with their own cars and camping out. While we did not always have sufficient labor available to give these camps proper attention, they were appreciated and complaints were few.

No movable-camp licenses were issued for wagon and saddle horse transportation.

Special permits were issued to parties holding properties in the mining camp of Cooke, Mont., to use their motors for hauling supplies to and from Gardiner, Mont., through the park, as follows: Nels E. Soderholm, Yellowstone Mining Corporation, Western Smelting & Power Co., Buffalo-Montana Co.

These parties have done comparatively little hauling, and what they have done has been rather expensive for them, due to the fact they expended considerable money repairing the road and bridges after the high water had washed them out in many places.

Motor cars and trucks were generally used by different branches of the Government, and by concessioners, in handling regular business in the park. Special permits for these were issued without charge.

CONCESSIONS.

All concessioners operating in the park showed their usual fine spirit of cooperation, and complaints from the public resulting from any friction between different interests were practically unknown during the summer.

As in every line of work, due to unusual war conditions, all kinds of labor and supplies are scarce, and economy under all conditions is a virtue. Consequently additions to plant, improvement of buildings, and similar work that can be postponed is discouraged, and only actual necessary expenditures for maintenance is encouraged. For these reasons many improvements under consideration by concessioners were not made.

The Yellowstone Park Hotel Co. did not open any of its hotels in the park, and only a keeper for each hotel was employed.

The only accommodations available in the park were at the Mammoth, Upper Basin, and Canyon Camps, operated by the Yellowstone Park Camping Co. The fact that the hotels did not open made business fairly good for the camping company, even though travel was light. As a rule, the accommodations were excellent, and complaints were few. A new building was constructed at Mammoth Camp for office, dining room, and amusement room, and while it is not satisfactory from an architectural standpoint, it serves its purpose well and adds much to the comfort and pleasure of the public. A garage for taking care of private automobiles was also built at Mammoth. At Upper Basin Camp but little improvement work was done, due to scarcity of labor. A new laundry was constructed. An extension to the log dining room, commenced late last fall, is still unfinished, though it was badly needed during the height of the season. At Grand Canyon camp a rough log building was erected for use as a laundry, and a large warehouse and a garage are under construction.

The Yellowstone Park Transportation Co. operated the only transportation line in the park, and handled all travel from the trains at Gardiner, Yellowstone, and Cody. As this kind of travel was light, only a small part of the extensive plant of this company was in use during the season. The service was improved over the 1917 season; drivers were usually careful and attentive to passengers, and complaints were few. A new garage, 50 by 200 feet in size, was built by this company close to the Lake Hotel late last fall, but has not been put in use, as there was no stopping place at the lake during the season.

Practically no business was done by the Yellowstone Park Boat Co. during the summer, as there was no opportunity to patronize the boats, due to the lack of accommodations for the night at the Lake Outlet. A few of the motor and other boats were inspected by a representative of the Steamboat-Inspection Service, for use in case there was any demand for them. The boat company's store at Lake Outlet was run by Mr. C. A. Hamilton as a branch of his main store at Upper Geyser Basin.

Mr. George Whittaker had his post-office store at Mammoth Hot Springs open throughout the year. He also ran a general store at Grand Canyon during the tourist season, his contract with the National Park Service having been extended for a term of years to cover this additional business. The hotel company's extensive vegetable garden, located at the head of Gardiner Canyon, and planted as usual last spring for use of hotels, was taken over by Mr. Whittaker when it was decided not to open the hotels, and the crops have been marketed by him, mostly to our road-construction camps, at cost. This was done at a loss to the hotel company, and with but little, if any, profit to Mr. Whittaker, at my request as a food-conservation measure.

Mr. C. A. Hamilton did a fairly good business at his general store at Upper Basin, and also ran the lake store, as heretofore noted.

Mr. J. E. Haynes kept his shops at Mammoth and Upper Basin open throughout the season, maintaining as well booths in the three permanent camps. He also kept the picture shop and information bureau at Tower Falls open during the most of the summer. A small frame building, formerly belonging to the Yellowstone-Western Stage Co. at Mammoth, was, with permission of the National Park Service, moved to the rear of his residence and studio for use as a storehouse.

The bathhouse at Upper Geyser Basin was operated under the concession to Frances F. Brothers throughout the season. A total of 2,290 persons used these baths, of whom 2,029 were tourists and 26 were park employees.

Business was fairly good at the ice-cream parlors and curio shop operated by Mesdames Pryor and Trischman, and this store was kept open throughout the season.

The permit issued during the season of 1917 to Jay Wilcox and Jim Parker, of Gardiner, Mont., to cultivate an acre of ground in Turkey Penn Pass, on Yellowstone River about 2 miles above Gardiner, was renewed and extended to cover about 4 acres of land.

Mr. Robert I. McKay, who holds a permit authorizing him to construct a metal-surfaced road through the park between Gardiner and Cooke, Mont., so as to permit of the development and marketing of valuable mineral resources in Cooke, made no progress except to do some surveying for his right of way.

STATEMENT OF REVENUES RECEIVED.

Revenues were collected from concessioners, sale of automobile and motorcycle tickets, etc., as follows:

Sale of automobile permits	$39, 880. 80
Collections from concessioners	26, 057. 81
Camping party licenses	172. 00
Sale of electric current	1, 220. 61
Sale of water	176. 89
Miscellaneous collections	784. 35
Total	68, 292. 46

STREAM GAUGING.

The following memorandum of work done in the park under this head is furnished by Mr. G. Clyde Baldwin, district engineer of the water-resources branch of the United States Geological Survey, Boise, Idaho, under whose direction it is carried on:

Summary of hydrometric work, October 1, 1917, to September 30, 1918.—Records were obtained at the following gauging stations which were established in 1913:

Madison River, near Yellowstone, Mont.; Yellowstone River, above upper falls, in Yellowstone Park; Snake River, at south boundary of Yellowstone National Park.

Because of frequent changes in the personnel on duty at the different soldier stations, and because of periods when some of the stations were unoccupied, the gauge height records are perhaps less satisfactory than in former years, but still suffice to afford records at each station, except the one on the Yellowstone, throughout the greater part of the year. The latter was temporarily discontinued during the winter months. Two series of actual current meter measurements were obtained at these stations during the year by survey engineers. During the month of June a reconnaissance was also made of Tower Creek in the vicinity of Tower Falls. Because of the high stage of the stream at that time and the fact that no camp was to be maintained in the vicinity during the season of 1918, it was not deemed advisable to install a new station. A recording gauge and the necessary materials for its installation at the Madison River station were purchased during the year, and the actual construction work will be done during the present month (October). Signs for the guidance of tourists were purchased and installed during the year at each of the three above-mentioned gauging stations. Acknowledgments should be made for transportation and subsistence which were furnished free to survey engineers as during July, 1917, by the transportation and camping companies during the regular park season. Detailed descriptions of the gauging stations, together with summaries of current meter measurements and discharge data for each, will be published in the annual Water-Supply Papers of the United States Geological Survey, Parts IV and XII, respectively, for Missouri and Snake River drainage areas.

While such cooperation as was possible was given Mr. Baldwin by scouts employed by this office and by soldiers at stations under the commanding officer at Fort Yellowstone, changes at the gauging stations have necessarily been so frequent that the work has been rather unsatisfactory during the past year. Instructions have been given to rangers recently taking over these stations to give due attention to the rendering of these reports and of those to the United States Weather Bureau, which are also of interest and value.

WEATHER REPORTS.

A branch office of the United States Weather Bureau is maintained at Mammoth Hot Springs in the park in charge of Mr. G E. Lawton, observer, and under his direction and by the use of instruments furnished by his office temperature and precipitation records are made at six of our park stations. These records are of much interest and practical value.

ROADS AND IMPROVEMENTS.

During the early history of the park and up to the end of June, 1894, the construction of roads, bridges, etc., in the park was accomplished by special appropriations under the Secretary of War, administered by officers of the United States Engineer Department. From July 1, 1894, to June 30, 1899, this appropriations act was worded so as to permit its expenditure under the Secretary of the Interior, through the park superintendent, when it was changed and again placed under charge of the Engineer Department of the Army. This was again reversed by the sundry civil bill approved July 1, 1918, which placed all activities in Yellowstone Park under the jurisdiction of the Secretary of the Interior through the National Park Service. Therefore for the period to the end of June, 1918, this work was done under the direction of the Chief of Engineers, represented here since November 1, 1917, by Maj. George E. Verrill, E. O. R. C. Maj. Verrill has been relieved and has gone to another station, therefore the following notes on the work accomplished under his direction have been taken as best they might from his reports:

General road construction and maintenance was continued as late in the fall of 1917 as the weather permitted. Warm weather in the spring of 1918 melted the snow rapidly, so that small crews were put on general repair work during May and as much work done as funds on hand permitted.

In general the work accomplished was as follows:

North approach.—The Gardiner slide, which for several years has been giving increasing trouble, threatened to entirely close the north approach road. Throughout the summer of 1917 the road was kept open by a small crew, and at the end of October the steam-shovel was put at work cutting off the toe of the slide and throwing the material into the river. Work was continued until January 16, 1918, when the general condition of the road was considered good. However, as soon as the frozen ground began to thaw, the slide movement became so rapid that it was considered impracticable and too expensive to attempt to keep the road open. To keep a means of communication open work was begun repairing and realigning the old freight road over the hill. Grades were reduced from a maximum of 20 to 10 per cent and necessary bridges and culverts constructed. As an emergency road a width of 10 feet was adopted and no graveling or other improvements attempted. It was necessary to realign 10,000 feet of road and widen and repair the entire 5 miles; total amount expended was $4,150. Early in June a sudden spell of hot weather followed by heavy rains caused an exceptionaly high freshet in the Gardiner River, which resulted in the complete destruction of nearly 1 mile of the road through the Gardiner Canyon, causing the abandonment of this road and necessitating the entire use of the old freight road as a means of communication with Gardiner and railroad transportation. Owing to the character of the material of which this road is composed it is very slippery and muddy in wet weather, but has served its purpose satisfactorily by reason of the fact that it was built as a temporary road only until the main road could be repaired.

West approach.—Nine and one-half miles of this road from the west boundary have been finished during the past four years with oil macadam. Of this the first 5 miles are in excellent condition, the oiled surface being 18 feet wide and showing little signs of wear. On the remaining 4½ miles the surface is only 10 feet wide, and in many places is raveling and breaking badly, so that the general condition is hardly considered fair. The remaining 4 miles have not been surfaced, but the road is in good condition.

South approach (in the park).—General repairs were continued as late in the fall of 1917 as the weather permitted, but due to heavy snow no work was done in the spring of 1918. The general condition of the road is good, except for the numerous wooden bridges and culverts. These are comparatively temporary, and should be replaced when practicable.

South approach (in the forest reserve).—General maintenance on 25 miles of this road and construction work on Pilgrim Creek bridge were continued until late in October. The 366-foot bridge over Pilgrim Creek was about 95 per cent complete at this time, and needs only a small fill at the north end and hand rails.

Unusually high waters endangered all bridges during the month of June, and only strenuous efforts by rangers saved the bridges at Pilgrim Creek and Snake River. Small damage was done the approaches to the Pilgrim Creek bridge, but the east end of the north pier of the Snake River bridge settled about 2 feet, badly twisting the steel truss of 100-foot span, but not seriously damaging it.

East approach (in the park).—General repair work was continued until late in October, when Sylvan Pass was blocked with snow. At this time it is still closed, so that no work can be done High water during June, 1918, took several piles out of the bents under the Yellowstone River bridge, but its use is not impaired. The small bridge near Pelican Creek was washed out, but can be crossed.

East approach (in the forest reserve).—General maintenance work was continued until the end of the season throughout the 28 miles of road. Exceptionally high waters, said to be the highest on record, washed the road out in about 22 places, in most cases taking out the entire roadway, undermined the east abutmentof the Pahaska bridge and the west abutment of the North Fork bridge, as well as taking out the west approach of the North Fork bridge. As a result, the road is impassable at this time, but it is understood that the people of Cody and vicinity are at work making temporary by-pass roads.

Cooke City road.—The maintenance crew was removed from this road in September, due to scarcity of labor, and no further repair work done until May, 1918, when a small repair crew was sent over the entire length. However, the high water in June took out the log bridges over the Lamar River, about 180 feet long, and Soda Butte and Pebble Creeks, thus completely closing traffic. This road is used principally by private interests in Cooke City, so that at this time traffic is being maintained by a cableway across the Lamar River and detours, with fords across the smaller creeks.

Main belt line.—General repairs and grader work were continued throughout the season. An early spring allowed flying grader crews to get out in May. Frequent rains made the roads muddy and easily rutted, and, so far, no sprinkling has been necessary.

Work was continued on the fire-hole realignment until October 23, 1917, at which time 5,700 feet had been completed; another 1,000 feet was about 50 per cent complete, and the remaining 1,000 feet had not been started.

Work on the water-bound macadam base between Norris and Mammoth Hot Springs was discontinued in September, due to scarcity of labor, and what men who were left graveled 2,400 feet on the same road in the vicinity of the Hoodoos. Using dump trucks this road was graveled an average of 13 feet wide and 5 inches deep. When rolled this made an excellent road. The cost was at the rate of $2,000 per mile.

An attempt was made during June, 1918, to oil the macadam base, laid during the season of 1917, and 19,000 gallons of heavy oil were purchased and stored at Gardiner. Due to wet weather only one section 1,050 feet long and 14 feet wide, was oiled by the close of the year.

Bridge and culvert work was done as follows:

One reinforced concrete culvert 4 feet by 2 feet 3 inches by 42 feet in Dunraven Pass, 9.2 miles from Canyon Junction.

One reinforced concrete culvert 4 feet by 2 feet 3 inches by 30 feet, Yancey Creek, 1.5 miles west of Tower Falls Station.

One reinforced concrete culvert 6 feet by 4 feet by 72 feet, at Geode Creek, 12½ miles east of Mammoth Hot Springs on Tower Falls road.

One double-reinforced concrete culvert, each opening 6 feet by 2 feet 3 inches by 18 feet on Swan Lake flats, 5 miles south of Mammoth Hot Springs.

Same kind of culvert being built at Apollinaris Spring, 10 miles south of Mammoth Hot Springs. (Not completed.)

Coal mine.—Due to the fact that it was seemingly impossible for the department to purchase a supply of coal for the winter, an old mine was opened on the face of Mount Everts in October, 1917. Four hundred and sixty-seven tons of coal were mined and delivered to headquarters and served all purposes. The total cost of the coal, including development, timbering, and hauling, was $9.27 per ton.

Bunsen Peak road.—During the spring of 1918 general repairs were made and two log bridges were built on this road, making it safe for vehicular traffic.

Headquarters.—Five thousand and five hundred feet of roads in the vicinity of Mammoth Hot Springs and Fort Yellowstone were graveled to a width of about 20 feet during the spring. After the snow melted general maintenance of the grounds in the vicinity of Fort Yellowstone and at the northern entrance was continued. Tentative plans for engineer quarters were prepared and submitted during the winter. Plant and equipment at heaquarters were put in repair so as to be in first-class condition for the season's work

Platforms and boardwalks.—Ten landing platforms at various points of interest, originally built to accommodate passengers alighting from horse-drawn vehicles, were lowered to accommodate automobile passengers. In the Norris Geyser Basin 722 linear feet of new walk was built and 246 linear feet of old walk repaired. At the Thumb 185 feet of old walk was repaired, and at Tower Falls a landing platform was built with steps leading to the top of the bluff.

The sundry civil bill, approved July 1, 1918, under national parks, page 49, reads:

"Yellowstone National Park, Wyoming: For administration, protection, maintenance, and improvement, including not to exceed $7,500 for maintenance of the road in the forest reserve leading out of the park from the east boundary, not to exceed $7,500 for maintenance of the road in the forest reserve leading out of the park from the south boundary, for repairing roads in the park and in adjoining forest reserves from Lake Hotel to the Cody entrance, $25,000; not to exceed $7,600 for the purchase, operation, maintenance, and repair of motor-propelled passenger-carrying vehicles, and including feed for buffalo and other animals and salaries of buffalo keepers, $269,520, to be expended by and under the direction of the Secretary of the Interior: *Provided*, That not exceeding $2,000 may be expended for the removal of snow from any of the roads for the purpose of opening them in advance of the tourist season.

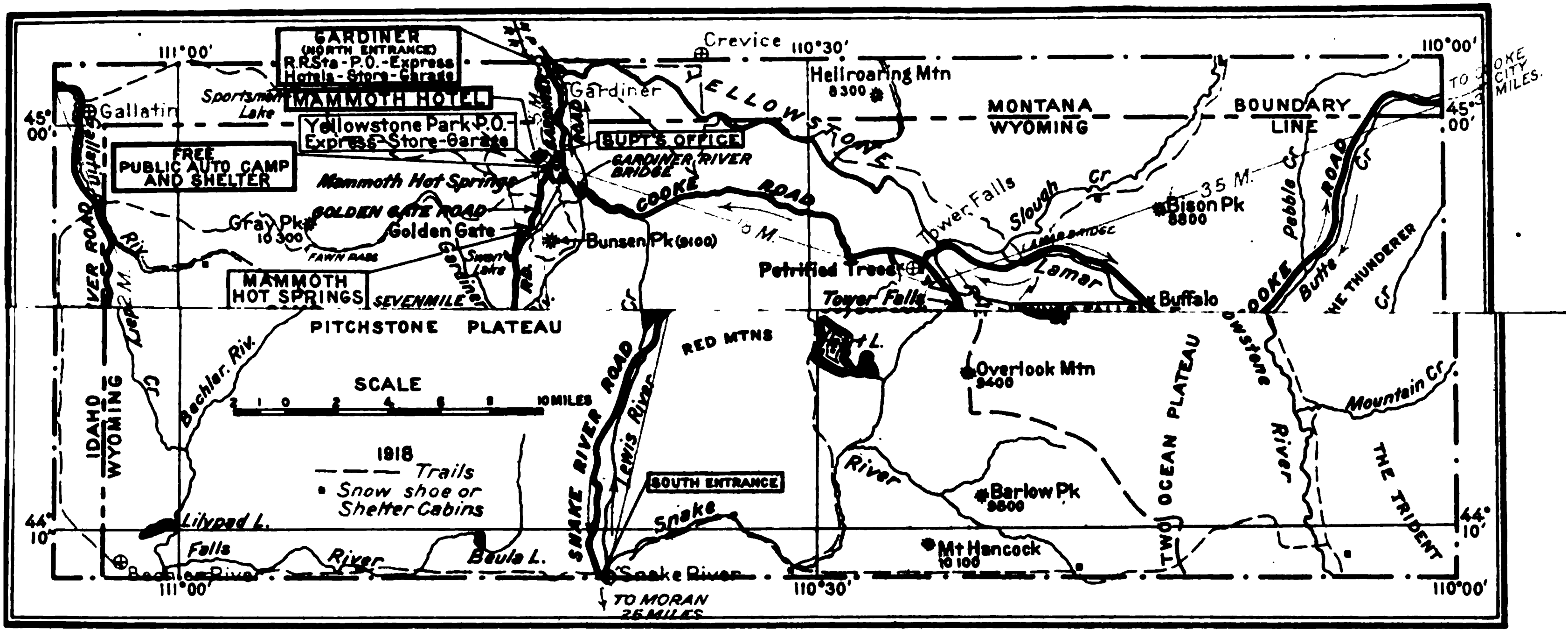
"Hereafter road extensions and improvements shall be made in said park and in harmony with the general plan of roads and improvements to be approved by the Secretary of the Interior.

"For continuing the widening to not exceeding eighteen feet of roadway, improving the surface of roads, and for building bridges and culverts from the belt-line road to the western border, from the Thumb Station to the southern border, and from the Lake Hotel to the eastern border, all within Yellowstone National Park, to make such roads suitable and safe for animal-drawn and motor-propelled vehicles, $15,400.

"For a new road around the Gardiner slide, $50,000.

"For resurfacing and for finishing the belt line with oil macadam, the unexpended balance of the appropriation for the fiscal year nineteen hundred and eighteen is made available for the fiscal year nineteen hundred and nineteen."

Under the provisions of this bill the improvement and maintenance work has been combined with the work of administration and protection of the park under this office,



ENGRAVED AND PRINTED BY THE U.S. GEOLOGICAL SURVEY

MAP OF YELLOWSTONE NATIONAL PARK

⊕ Denotes Ranger Station ←— Direction of Travel

Distances given are between main points by road.

the maintenance and improvement work being under the direct charge of Mr. George E. Goodwin, civil engineer, National Park Service.

By this combination this department has undertaken to make a saving of at least $20,000, and this I am confident we shall be able to do, in addition to eliminating needless friction and division of authority, and giving much greater efficiency.

At the beginning of the season most of the roads of the park were in the worst condition that they have been for years. The high waters of the last of May and the first of June, the highest that have been recorded for years, did great damage to most of the roads, and certain sections of roads were entirely washed away and many of the bridges and culverts were either damaged or washed out.

The north entrance road, from Gardiner to Mammoth Hot Springs, which was built by Gen. Chittenden in 1900, and which is the most used entrance to the park, was very badly damaged by the floods of the Gardiner River, about three-fourths of a mile of the road through the Gardiner Canyon being entirely washed out, and the bridges were either washed out or the piers undermined and settled out of level. Most of the damaged section of the road had been originally constructed at a large expense, as it was built on a location largely reclaimed from the original river channel and consisted of rock and earth fills retained by concrete and stone revetment walls. This section of road was so completely destroyed that a new road will have to be constructed through the canyon on the opposite side of the river, which will involve some very heavy construction, but it will avoid the so-called Gardiner slide, which has given so much trouble during the past two years and has at times for short periods closed the road to travel.

The eastern entrance, or Cody Road, was also badly damaged both within the park and through the national forest east of the park, which road is also maintained and improved by this department. Not less than 12 serious washouts occurred, some of which were several hundred feet in length, and all of which required rock or timber revetment to prevent the Shoshone River from again washing out these pieces of road. Considerable damage was also done to the new steel bridges recently erected, as the abutments were badly undermined and settled and the approaches were washed out.

On the Snake River Road, or southern entrance, several small structures were washed out, as were the approaches of the Pilgrim Creek bridge, and one of the abutments of the new steel bridge across the Snake River was so badly undermined that the bridge was thrown out of transverse level fully two feet, all of which necessitated heavy repairs, both within the park and in the forest reserve south of the park.

The belt line or "loop roads" in the park were not so badly damaged as the north, east, and southern entrance roads, but many of the cross-drainage structures proved incapable of conveying the floods and were washed out, as were many short sections of roads paralleling the streams.

The Corps of Engineers, United States Army, made such repairs to the roads as were possible prior to July 1, and got all of the southern loop road, the northern and western entrance roads open to travel at the beginning of the park season, either by the construction of temporary roads, as in the case of the northern entrance, or by making the necessary temporary repairs to the damaged roads. The southern and eastern entrance roads were open to travel about the 2d of July, most of the first preliminary temporary repairs on the Cody Road through the national forest being made by the people of Cody in order that automobile tourists that had come to the Cody gateway might enter the park as planned. Great credit is due the public-spirited citizens of Cody for their energetic and timely efforts in this work.

In addition to the ordinary maintenance and repair work of the roads in the park and the sprinkling of some of the driest and most dusty stretches, some of the muddiest and heretofore badly rutted sections of road were graveled and otherwise improved. Between 2 and 3 miles were regraded and graveled between Apollinaris Spring and Norris Basin. Eight steel bridges were also painted, and two small concrete culverts and a number of corrugated culverts were installed.

The temporary log bridge across the Lamar River, which was built by the mining interests of Cooke City to replace the structure washed out, was strengthened and otherwise improved to accommodate truck hauling, and a crew is at work improving the Cooke City Road.

The extreme shortage of labor made it necessary to confine the work to the most needed and minor repairs and to delay the heavy reconstruction work until the park tourist travel had closed for the season, when it is proposed to repair the Snake River bridge, reconstruct the Gardiner Canyon Road, and complete the repairs of the Cody Road. The general average maintenance and repair force averaged about 150 men and 70 teams, whereas to have maintained and completely repaired the roads during the season would have required at least 350 men and 100 teams.

FISH.

The hatchery, located on the shore of Yellowstone Lake near its outlet, was operated during the summer as usual by the United States Fish Commission, under the direction of Mr. W. T. Thompson, the superintendent of the hatchery at Bozeman, Mont. An attempt was made to supplement the work of collecting eggs of the black-spotted trout in the park by gathering those available at a small lake in Soda Butte Creek, near Soda Butte Station, generally known as Fish Lake. (Not shown on the map.) A man was sent in on June 11 to make this collection, but the same day the Lamar River bridge was washed away, so the eggs could not be brought in without great expense and the project was abandoned. Mr. Thompson has furnished me with the following notes on his work in the park for the season of 1918:

"I regret that I am obliged to state that the season of 1918 was the most unsuccessful we have experienced in years, due to the exceptionally hot weather in early June, which ran off the snow on the mountains and in the timber, creating havoc at that time with roads and bridges in the park and devastating the country to a greater or lesser extent throughout the entire Yellowstone Valley.

"These floods in June, which damaged your work so greatly, deprived us of the usual flow of water during July. The volume was so slight in the spawning streams at that time that the spawning trout did not feel the 'urge' of nature sufficiently to ascend to the usual spawning fields. In addition, the piratical 'Huns' of Yellowstone Lake, the pelican and gull, stood on guard at the mouth of the streams, where the shallow waters enabled them to capture a large proportion of the fish which attempted to ascend the streams and scare away many others.

"Our men saw many young fish of last year's hatch, which were very likely a part of the large number we planted from the lake hatchery last fall.

"Our Mr. J. H. Brunson, after many discouragements, managed to get to Soda Butte Lake, but owing to the absence of the Lamar Bridge it was impossible to ship eggs, so he contented himself with protecting the brood fish from poachers. He did take 600,000 eggs, which he planted around the lake and in a smaller lake near by.

"From the streams flowing into Yellowstone Lake we took 3,096,000 additional eggs, from which we hatched 200,000 fry from the early eggs taken and planted them as follows:

Clear Creek	35,000
Cub Creek	45,000
Columbine Creek	30,000
Pelican Creek	30,000
Natural Bridge	30,000
Thumb Creeks	30,000
	200,000

"From the remaining eggs we eyed and shipped 2,728,000 to various Federal hatcheries at Leadville, Colo.; Spearfish, S. Dak.; Saratoga, Wyo.; Birdsview, Wash.; Clackamas, Oreg.; Bozeman, Mont. In addition, a shipment of 265,000 was made to the new hatchery at Glacier Park, where the resulting young fingerlings were planted in park waters.

"One small shipment each was sent to the United States fisheries exhibit at the Illinois State Fair Grounds at Springfield and the other to the Detroit Aquarium, for educational purposes.

"It is hoped and believed that the next season will show a substantial increase in the number of spawning fish and the resulting egg harvest due to the plants of recent years.

"Work completed August 26."

Fish fry of other varieties were not shipped in for planting in park waters last spring, as usual, on account of the unusual difficulties attending their transportation.

Fishing was excellent throughout the summer, and many fine catches were made by tourists and employees. No violations of the law were reported. Exception was made as to the number to be taken in one day in favor of the Camping Co., so as to provide the tables at the camps with trout, which are a great treat for tourists.

WILD ANIMALS.

The fall of 1917 was beautiful and warm, and winter did not come until late. The road to Sylvan Pass was not opened until October 28, to Snake River until November 9, and as late as November 23 the going was as good on the west side of the park as in summer. Even December was 5.6° warmer than normal, so the game animals were in splendid condition and had plenty of excellent winter range left for them when the severe weather finally came the latter part of December. The warm weather came again in March, which was 5.4° warmer than normal, and uncovered considerable grass on the foothills, making in all a rather short and favorable winter for elk, deer, antelope, and mountain sheep, and the loss among them was slight.

The fair weather in October, November, and December was a disappointment to hunters, for the elk and deer did not come down where they were easily shot, and but few were killed by legitimate hunting in the adjoining States. Special attention was given to the care of these animals by the four scouts employed, but they were unable to cover the park lines entirely during the hunting season, and the enlisted men at the park stations, to whom this work was intrusted, were mostly unacquainted with the country and in many cases did not take this duty seriously. I am satisfied that this part of the protection of the park was sadly neglected, and it was fortunate that the fair weather kept most of the wild animals up in their summer range in the mountains beyond the reach of hunters.

From January 5 nearly every day to March 19 hay was fed in the vicinity of Gardiner and along the road as far as Mammoth Hot Springs to the deer, mountain sheep, antelope, and about 3,500 elk that came in for it. About 350 tons of hay was fed, of which 100 tons was cut on the field near Gardiner and the balance was purchased from near-by ranches. The wisdom of trying to feed any large number of elk is questionable; but it is necessary to preserve the small numbers of mountain sheep, deer, and particularly the antelope, by supplying them with hay when most needed during the severe winters. The elk, which are much more numerous, can be cared for outside of the park by saving winter range and raising or buying hay for them in the adjoining forest reserves, but the antelope are too few to risk their loss outside of the park.

Special attention was given to the care of these animals by our most experienced men, and five additional scouts were hired for this purpose during the winter months, as the troopers who garrisoned the park stations were inexperienced in this line of work. Numbers estimated from 3,000 to 4,000 again left the park and went down the Yellowstone Valley for several miles, apparently not so much in this case because of the necessity for finding forage—for the natural food in the park was plentiful and easy to get at all winter—as from force of habit from the preceding winter, when they were starved out by deep snow and severe weather in the park and found refuge among the haystacks on the ranches below. Again the United States Forest Service and the State game wardens cooperated with the National Park Service to protect these animals against ruthless slaughter by poachers, with good results. Even then unmistakable evidence was found in February and March of the killing of 50 elk by poachers, 34 of which were cows, probably killed for meat, and 16 bulls, killed for tusks or heads. One or two arrests were made by the forest rangers and the accused turned over to the State game warden for trial. Most of these elk returned to the park in April and May.

Antelope.—The antelope wintered in excellent condition, most of them just inside the north line fence near Gardiner. On November 29 some dogs from the town of Gardiner got among them and frightened them badly, and while probably none of them was killed it was several weeks before they recovered from their fright and returned to the alfalfa field and vicinity. A few were killed by coyotes during the winter, but aside from this the loss was negligible. About 350 was the largest number seen in any one day, but no special pains were taken to make a complete count of the herd. The antelope did not bother about trying to leave the park as in previous winters. They became accustomed to the presence of elk on the feeding grounds and mingled quite freely with them.

Deer.—About the usual number of deer was noted, of both white-tailed and and black-tailed varieties. Slightly more than a hundred of them, mostly black-tailed, came in for hay during the severe weather; but most of them remained scattered throughout the mountains along the north line of the park, as forage was not hard for them to obtain. Six black-tailed deer were captured by representatives of the United States Biological Survey, assisted by our scouts, on April 15, and shipped to the Montana Bison Range.

Elk.—Elk were numerous, tame, and in excellent condition throughout the winter. At least 3,500 of them came down to the feeding grounds around headquarters and the northern entrance, and those which have acquired the habit of coming down are becoming tamer and more dependent upon the hay each year. While no accurate count was made of the herds of elk during the past year, more than 20,000 were seen in the park in the month of January, with no special effort having been made to count all of them. The Gallatin herd always winters outside of the park, and reports of forest rangers at that time indicated at least 2,000 of the northern herd outside in the forest reserve, north of the park. During the summer many small herds of cows, with their calves, have been seen close to the main roads by tourists and others, and at the present writing it is safe to state that the elk are in first-class condition, with a good crop of calves, and excellent prospects for plenty of food for the coming winter, as the ranges are in fine shape, due to a very wet summer.

The gradual invasion of that part of the natural winter grazing ground of the elk adjoining the park by settlers taking up land and by grazing permits in the national forests to some extent threatens the preservation of the elk, particularly during severe winters, and remedial measures should be agreed and acted upon by the States, the Forest Service, and the National Park Service at an early date, before it is too late to do so without great expense. But I seriously question the theory advanced by some, that they are likely to be entirely exterminated by these conditions, as we have sufficient winter range for fifteen to twenty thousand elk within the boundaries of the park itself during ordinary winters, and many thousands survived the winter of 1916–17 without leaving or being fed, and this was positively the hardest winter on record in this country. Representatives of the United States Forest Service, under direction of the Forester, Col. H. S. Graves, have been making a study of this situation as regards elk grazing in the national forests near the park, and are still so engaged. The "Greater Yellowstone" addition to the park, to include the Teton Mountains on the south, will, if made, assist in solving the question of winter grazing for the southern herd of elk, but as this herd winters almost entirely outside of the park, it would seem that at present the burden of responsibility rests entirely upon the State of Wyoming and the Forest Service to reserve for it sufficient winter feed. The same may also be said of the Gallatin herd, which winters in the Gallatin National Forest in Montana. But these herds belong to the park in summer, and since their preservation and protection for the benefit of the public should be and is the aim of all, the full cooperation of the three parties who can control the situation together is vital. This is even more important in handling the northern herd, which frequently passes back and forth across the park line several times during the winter. It would seem best, if possible, to provide adequate winter grazing for these elk, rather than to endeavor to go to the expense of buying or raising hay for common use, as the latter course is likely to result ultimately in the elk becoming entirely dependent upon being fed hay in winter. But this is a problem which is being worked out, and which should be solved and put into effect soon. Elk from the park herds were shipped and otherwise disposed of as follows:

Shipped to other States, public parks, etc., under authority of the National Park Service, at the expense of the parties receiving them:

To the State of Idaho, Feb. 2, 1918, by freight, in 2 cars	50
To the city of Aurora, Ill., Feb. 18, by express crated	2
To the city of Fort Worth, Tex., Feb. 19, by express, crated	1
To the city of Crookston, Minn., Feb. 21, by express, crated	2
To Elk Run, Mont., Mar. 18, by freight, in 1 car	25
To the State of Arizona, Mar. 20, by express, in large car	60
To the city of Mexico, Mo., Mar. 20, by express, crated	4
To the city of Mexico, Mo., Apr. 16, by express, crated, to replace 1 shipped earlier, that died en route	1
Total shipped	145
Elk killed by accident in making captures of above for shipping	9
Killed by hunters in country adjoining the park during the open season and reported	249
Killed by poachers in the national forest north of the park	50
Killed by poachers inside of the park, and evidence found	10
Killed by mountain lions, wolves, and coyotes, and evidence found	87
Found dead from unknown causes	18
Total known to have been taken from park herds	568

I regret that in several of the cases of apparent poaching in the park the evidence was found in the near vicinity of soldier stations. A black-tailed deer was butchered on the night of October 20 on the west side of Capitol Hill in plain sight of my front door and that of the commanding officer, who lived in the adjoining house. Cases of poaching were more frequent than I have ever known them before, and no arrests were made for this violation of law.

Moose.—Moose are frequently seen, and seem to be well scattered over most of the park. About 50 have been seen in the Upper Yellowstone country since September 1. On at least three occasions during the summer they have been seen from the main road in the park.

Buffalo, wild herd.—This herd was located in March on Lamar River and in Pelican Valley, but not counted. Four calves, present with that part of the herd seen, indicated a fair increase. They appeared to have wintered well.

Tame herd.—The tame herd, located on Lamar River, is increasing rapidly and is in excellent condition. There are now a total of 885 animals, namely, 176 males and 149 females, from 1 to 22 years old, and 60 calves born during the past summer, sex undetermined. One year ago—October 1, 1917—there were 179 males and 151 females. One 7-year-old bull was disabled and had to be killed on February 29, and its carcass was donated as a specimen to Hastings College, Nebr. A 8-year-old cow broke through the ice in the pasture and was drowned on March 8. A bull calf was hooked to death on April 18; a 4-year-old bull was found dead on Specimen Ridge in June; and a 4-year-old cow was found dead near the same location on July 1, in both cases cause unknown. The 1917 crop of calves was vaccinated for hemorrhagic septicemia on November 3 and again on November 12 by Dr. F. C. Swaney, a veterinarian of the Department of Agriculture. Under your authority, dated November 6, Dr. Swaney returned on November 16 and 17 and castrated 60 per cent (44) of the male calves (20 of the 1916 and 24 of the 1917 crop). No serious results were noted. The usual show herd of 15 tame buffalo was brought in to Mammoth for the benefit of sight-seers at the beginning of the tourist season, but they broke through the fence after about four weeks' stay and went back to the main herd, and due to shortage of help to herd them we were unable to bring them back. There were 278.98 acres of meadow land across the Lamar River, and about 3 miles above the present buffalo farm, plowed during the season of 1917, to be seeded later to grass. Of this land 65.6 acres were seeded to rye last fall, to be cut this fall for hay, and has recently been cut and stacked, producing about 100 tons of good hay.

Last spring 65 acres, which was partially disked and harrowed last fall, was cultivated further and sowed to oats, also with the intention of cutting it for hay, but the herder quit during the summer and could not be replaced, and the buffalo tramped this and kept it eaten off until it was too short to harvest. The balance of the plowed land has been summer fallowed, and more rye will be sowed this fall for next year's hay crop. Eventually, when this land has been worked sufficiently to make it smooth, it will be seeded to grass. A half mile of main irrigation ditch was built in connection with the cultivated land, but it is not yet completed. The 200 acres of meadow land was last irrigated and cut for hay. The tame buffalo were grazed most of the summer on Specimen Ridge, Mount Morris, and vicinity.

Bears.—A few grizzly bears were seen during the summer. A large one was caught in a trap in October, to be shipped to the city of Butte, Mont., but broke away and escaped. Black bears, which were very plentiful, are seen and admired by everybody, and are one of the greatest attractions in the park. Naturally shy and inoffensive, the bears in the park are seen so often and fed by so many people that they lose all fear, and as they get older and larger they often become dangerous and have to be killed to protect human life and property. In July complaints of the depredations of bears were bitter and several automobiles were damaged by bears tearing up the upholstery. Nine bears were killed and one was found dying near Lake Camp with a bad wound on its head from a stone which laid close by, wielded, probably, by some angry tourist.

Coyotes and wolves.—These animals have done much damage to other game, and for that reason much pains has been taken to hunt them down and trap them. Two expert hunters were employed as scouts during the winter, and spent most of their time hunting and trapping. Steve Elkins, the famous guide and mountain-lion hunter, was also employed for several weeks with his pack of lion hounds, hunting lions, wolves, and coyotes, and the United States Biological Survey sent one of its hunters here for a time last spring, but he was not so successful as were some of our own men. He was finally called away by the draft. Another Biological Survey hunter, Mr. William D. Clemens, has been working on the Upper Yellowstone since August 1, and is trapping and hunting wolves and coyotes along both sides of the park line. In all, 190 coyotes and 36 wolves were killed in the park during the year. While there are more of these animals in the park than are desirable, I am of the opinion that there are not so many found among the game animals as there are among domestic animals in farming communities outside, as I have been informed by the State game warden of Montana that during 1917 there were killed 848 coyotes in Gallatin County, 1,533 in Park and Sweet Grass Counties, and 301 in Carbon County.

Mountain lions.—Twenty-three mountain lions were killed in the park during the year. These were hunted by Steve Elkins and Scout Anderson with trained dogs.

Mountain sheep.—Mountain sheep seemed to be thriving and were seen frequently during the winter along the road to Gardiner. The winter was so mild that the sheep seldom came down for hay, and our attempt to bait them into a corral, to capture and dip them for sheep scab, failed. But no sign of the scab, which was in evidence the previous winter, was noticed on them, and it was hardly necessary to treat them. The Mount Everts band can usually be found within an hour's ride from headquarters from October to May, inclusive, and are easy to approach and photograph. Fourteen fine rams were seen and approached by parties on saddle horses to within a hundred feet on the north end of Mount Everts on May 7.

Beaver.—These most interesting animals are in evidence in nearly every stream in the park. Their dams and houses may be seen from several points along the main roads, and they can be seen at work if one cares to take the pains to visit their homes just before dark.

Other animals.—Porcupines, which a few years ago seemed to have disappeared from the park, are now numerous and are frequently seen along the roads. Rabbits, gophers, red squirrels, chipmunks, and woodchucks are much in evidence, and are seen by all visitors. Lynx, bobcats, foxes, otter, marten, mink, weasels, conies, skunks, muskrats, etc., are found, but not frequently.

The development and protection of the wild-animal life in the park, which was only considered of secondary interest for many years, has become to be generally known as a feature of utmost importance to the public. Our animals are becoming tamer and more is seen of them from year to year, and I doubt if anything in the park creates a more lasting interest and pleasure in the minds of most tourists than does a small herd of elk or a few scattering deer seen along the road; a herd of bison in the pasture at Mammoth or on Lamar River, where the main herd is kept; a porcupine along the roadside, which the driver will be careful to avoid if his car is not equipped with puncture-proof tires; and, best of all, the bears which frequent the camps and hotels, where they beg for food, although they are already so fat that they can hardly climb a tree if startled. And in winter it is well worth a trip across the continent to see the herds of elk, deer, antelope, and mountain sheep that may be found at or near the northern entrance. It is certainly a paradise for moving-picture artists in search of pictures from real life that will always command interest before any audience.

DISEASES OF ANIMALS.

Arrangements were made to capture and dip for scab the small band of mountain sheep that winters on Mount Everts and in Gardiner Canyon, but the winter was so mild that they did not come down for hay, and, as there was no evidence of the scab appearing again, the work was postponed.

The tame buffalo calves were, as usual, vaccinated last fall against hemorrhagic septicemia.

A few buffalo cows from the tame herd, which were known or suspected of habitual abortion, were separated from the main herd for the period when the disease is most likely to be contagious and sample of stomach contents of an aborted calf were forwarded to the Bureau of Animal Industry, Washington, D. C., for examination and analysis. If this disease is the contagious form it is not especially prevalent.

BIRDS.

Nearly 200 varieties of birds have been noted in the park as summer residents and are listed in our Circular of Information which is distributed to visitors. Quite a number of these remain during the winter. Canada geese, ducks, and other waterfowl on the lakes and rivers are very tame and of much interest to tourists.

PROTECTION OF GAME.

The sundry civil act approved June 12, 1917 (Public, No. 21, 65th Cong.), which provides funds for national parks, provided that "No part of this appropriation or the revenues of the Yellowstone National Park shall be used for payment of salaries for the protection of the park, authorized by the act of March third, eighteen hundred and eighty-three, to be performed by the detail of troops." This legislation made it necessary to regarrison Fort Yellowstone, which, by mutual consent of the War and Interior Departments, had been abandoned on October 1, 1916, and a squadron of Cavalry arrived on June 26, 1917, and such duties as pertained to protection of the game, etc., in the park devolved upon the commanding officer. These troops were inexperienced in work such as pertains to protection of national parks and wild animals, and were not properly equipped so far as transportation and other necessary articles are concerned. On December 22 this squadron was relieved by one troop of Cavalry from another regiment even less experienced in the class of work which they were sent for. Arriving so late in the season, they had no opportunity whatever to acquaint themselves with the territory to be covered in protecting the game animals, and were able to do but little good in this direction during the winter. These conditions were not conducive to successful work in the line of protecting the wild animals in the park, and the results are shown by the lack of arrests for poaching and other violations of law, and the evidences of poaching and violations which have been noted.

VIOLATIONS OF LAW.

At least nine cases of violation of the law regarding the killing of wild animals were recorded, but no arrests were made, and the evidence was not sufficient to take action in any case. One of these, the killing of a black-tailed deer, occurred on the grounds near Fort Yellowstone, and two elk were killed within a few hundred yards of the Gallatin soldier station, which burned soon afterwards, and which was garrisoned by a sergeant and one man, who are both under charges at the present time for stealing automobile tires in the park and trying to sell them in Gardiner the latter part of August.

Camp fires have been left burning in a few instances, but usually at one of the regular main camping places, where they were soon discovered and extinguished without any damage having occurred.

The regulation prohibiting the sale or serving of intoxicating liquor in the park and the Federal law prohibiting its being introduced into military camps or quarters have together acted as a deterrent in keeping it out of the park during the past year. But considerable difficulty has been had by the military authorities by worthless characters in the town of Gardiner furnishing it to enlisted men, indirectly, and the commanding officer has usually found it necessary to maintain a military guard at the soldier station near the town. Two men, whom the commanding officer was satisfied were furnishing whisky to his men, were, at his request, debarred from entering the park on the ground that they were undesirable, and the order debarring them is still in force.

On July 25 a tourist stopping at Upper Geyser Basin was arrested on the charge of treasonable utterances and his case has been turned over to the Department of Justice at his home in Memphis, Tenn., for proper action.

On September 23 complaint was filed with the United States Commissioner against John McPherson, of Gardiner, Mont., for transporting tourists through the park without proper license. He was tried September 26, pleaded guilty, and was fined $50 and costs.

SANITATION AND HEALTH PRECAUTIONS.

The special camps for automobile tourists were maintained at Mammoth, Upper Basin, Lake, and Canyon, and were appreciated. They were kept supplied with fuel for camp fires and cleaned up as often as men could be spared to do the work.

On the basis of a complaint to the National Park Service late in the summer of 1917, to the effect that the water used by the hotel company at Upper Geyser Basin was not good, the United States Public Health Service sent its laboratory car "Hamilton" to Gardiner, arriving on June 8, in charge of Lieut. Everett Judson and his corps of four assistants. Automobile and truck transportation and such assistance as was practicable were furnished him and during the following four weeks he made a careful test of all waters in the park that are ever used for drinking or culinary purposes. While his report has not been received, he made a few suggestions of immediate necessity in regard to the water in use at some points, more particularly at the Upper Basin Camp, which was presumed to be particularly good, but which he found dangerous. The camp-

Diablo meridian, California, within the meters and bounds of the Yosemite National Park, and changing the boundaries thereof," there were added to the park the Yosemite Valley, 48.60 square miles; Mariposa Big Tree Grove, 4 square miles; and a strip lying between the latter and the park proper, 2.13 square miles; and deducted by the change in the southwestern boundary, 13.06 square miles, making a net addition to the area of 41.67 square miles. The present area of the park is 1,124.41 square miles.

ROADS.

With the very marked increase in motor travel to the park, resulting first from th apparent increased desire on the part of the motoring public to visit the park by this means of transportation and, second, as a result of the curtailment of railroad travel during the past year on account of war conditions, repair, maintenance, and improvement of park roads have had to be considered as our main problem of operation, an have, without exception, constituted the greatest item of expenditure incurred agai the park appropriation.

The Government now owns and controls approximately 188 miles of roads in the par as follows: Roads on floor of Yosemite Valley, 25 miles; El Portal road from th Pohono Bridge, at the lower end of the valley, to the western park boundary near Portal, 8 miles; the Big Oak Flat road from the floor of Yosemite Valley to the weste park boundary near the Tuolumne Grove of Big Trees, 14 miles; the Tioga road fr the western park boundary near Aspen Valley to the eastern park boundary at Tio Pass, 47 miles; roads in the Mariposa Grove of Big Trees, 10 miles; Wawona road fr the floor of Yosemite Valley to the southern park boundary near Wawona, 20 mil Glacier Point road from its junction with the Wawona road at Chinquapin to Glaci Point, 14 miles.

Of the latter two roads 30 miles, namely, the Chinquapin road, from Chinquapin Glacier Point, 14 miles, and that part of the Wawona road between Fort Monroe, on th rim of Yosemite Valley, and the southern park boundary near Wawona, 16 miles, were pr viously in the ownership of the Yosemite Stage & Turnpike Co. During the past ye however, in connection with the revision of the concession of that company and as condition of granting an extension of its privileges, these roads were acquired the Government and have been maintained by the Government since that time. Wi the acquisition of these roads the Government now has the ownership of all of t roads in the park, with the following exceptions:

1. The Coulterville road from the floor of the Merced Canyon at a point one-half m below Cascade Creek to the western park boundary near the Merced Grove of B Trees, 11 miles, 4½ miles, however, of which do not lie within the park boundaries, b which would have to be acquired should the Government see fit to obtain possession those sections of the road lying within the park;

2. That part of the private road from its junction with the Coulterville road at point near Foresta to Crane Flat which is now owned and maintained by the Big Tr Auto Stage Co., operating under Government concession over what is known as t Triangle Route; and

3. That portion of the road known as the Hazel Green cut-off extending from t western park boundary near Hazel Green to Crane Flat.

Of these three sections of privately owned roads only one, the Hazel Green cut-off, considered of any particular value to the park, as it forms a link in one of the m routes into the park for visitors from Modesto and that part of the San Joa Valley contiguous thereto. This particular section of road is now a part of the Ma posa County road system, and comparatively little attention is given to it. Should Ma posa County show a desire to transfer this road to the Government I would recommend acceptance, or should its acquisition be feasible by any other means the question sho be given favorable consideration.

All of the Government-owned roads above mentioned, with the exception of appro mately 3 miles on the floor of Yosemite Valley, were at the beginning of the past ye ordinary dirt roads without surfacing of any kind. The fact that more than 75 p cent of these roads traverse high mountainous country and have been constructed w heavy grades and many sharp turns makes necessary the expenditure of a substant amount of money each year to put them in such a condition as to meet the needs of t heavy summer travel to which they are subjected. While the present, with the count at war, is not the time to give consideration to immediate extensive improvement these roads, it should, however, be kept in mind that some time in the future ve considerable expenditures must be made upon these roads with a view to making th more easily and comfortably passable to motor travel, which means in many cases elimination of existing sections and relocation of the same and reconstruction of oth sections where present grades warrant their continued existence. When it is co sidered that during the past year of war-time conditions more than 7,000 cars ha entered the park over these roads, a very notable increase over the previous year, can not help but be evident that under normal conditions there will be a distin increase from year to year and, therefore, a growing necessity for improvement roads to meet the conditions.

Prior to the entry of the United States into the war—that is, in 1915—anticipati the increased use to which the park roads would be put and also influenced by the ve extensive public movement toward the extension of the Mariposa lateral of the Sta highway to the park boundary near El Portal, thereby opening to the public an all-ye road into the park, the Service submitted to Congress estimates for appropriatio the reconstruction of the present El Portal road within the park. Substantial app priations have been made yearly since that time, and the actual work of reconstructi has been in progress since August, 1916, and will be continued under congressio appropriation during the coming year. Approximately 4 miles of the total length 8 miles have been graded to a width of 20 feet, provided with a rock coping whe necessary, and supplied with necessary drainage facilities, such as ditches, culver and bridges. The fact that Congress has considered this work inside of the park sufficient importance to authorize its continuance during the war period would indica that there is good reason why the Mariposa lateral should be continued, if possible, meet us at the park entrance near El Portal. That the California State Highway Co mission and various organizations throughout the State of California are deeply inte ested in the construction of this road is indicated by the fact that during the pa

year the State highway commission has allotted and made available for immediate use the sum of $175,000, which represents about 30 per cent of the total estimated cost of the completed road, and with the concurrence of the California State Automobile Association and other kindred organizations interested in a first-class highway into Yosemite have made application to the Department of Agriculture for Federal aid, such funds to be allotted from the Forest Service road allotments for the construction of highways in the national forests. Although I have been informed that this application received favorable recommendation by the local district officials of the Forest Service, the Department of Agriculture has not seen fit to divert such moneys to this construction work, which it does not deem essential as a war-time improvement. It is certain, however, that public interest will not lag in this project, and immediately conditions have been again restored to something like normal some means, either by additional allotments from the State highway funds or by Federal aid, the project will be completed and Yosemite will be connected with the outside world by a first-class highway of easy grade which will be easily kept open to travel throughout the year.

In addition to the continuation of the construction of the El Portal road, the park service during the past year authorized the expenditure of considerable moneys on the improvement of roads on the floor of the valley. All of the main roads on the floor of the valley from Pohono bridge to Happy Isles on the south side of the river, thence toward Mirror Lake and back again to the Pohono bridge on the north side of the river, approximately 19 miles in all, have been benefited by this expenditure to the extent that, with the exception of about 1 mile of road still uncompleted, all of these roads have been widened an average of from 12 to 15 feet in width to 20 feet in width and have been surfaced with from 3 to 6 inches of river gravel. The improvement is notable and more use has been made by motorists of these roads during the past year than ever before. Because of this improvement, however, which, at its best, can only be considered temporary, the fact must not be lost sight of that sooner or later when normal conditions will have again been established permanent construction work must be done on these roads, which means, in short, the laying of concrete surface. The gravel used in the recent surfacing is of granite formation and, while very satisfactory when first applied, decomposes very rapidly and pulverizes into fine dust, with the result that heavy travel causes a very rapid deterioration of the road surfaces. The improvement, therefore, already done—that is, so far as the surfacing is concerned—can be considered only as a temporary relief, and we face the problem of renewing the surfacing at intervals of from two to three years in order to meet the demands of motor travel. Concrete roads, while initially expensive, would be permanent, maintenance would be low, and the very expensive work of sprinkling would be eliminated for all time. This suggested improvement is also not one that we should hope to consider as justifiable for immediate expenditure, but one which should be kept in mind as a necessary after-war project.

TRAILS.

Aside from the construction of three trails hereafter mentioned, on the more than 600 miles of trails existing in the park comparatively little maintenance and improvement work have been done with the exception of that necessitated for the maintenance of the ledge trails from the floor of the valley up to and around the valley rim, which, of course, because of the heavy travel to which they are annually subjected, it has been necessary to keep in first-class condition That more work was not done on the outside trails—that is, the trails outside of Yosemite Valley—was due almost entirely to labor shortage, which, of course, has been a serious problem in our work, the same as in other institutions throughout the country, as a result of war demands.

Sufficient labor and money, however, were obtainable for the construction of three long needed trails, as follows:

1. The Babcock and Emeric Lake Trail, extending from a point on the McClure Fork Trail, about 2 miles north and east of Merced Lake, to Tuolumne Pass, at the head of Rafferty Creek, by way of Babcock and Emeric Lakes and Emeric Creek. This trail opens up a delightfully scenic country, shortens the distance materially from Lake Merced to Tuolumne Soda Springs, and offers a route between these points, which, because of its lower elevation, is open earlier in the spring, and is substantially less hazardous than the trail over Vogelsang Pass, which it has heretofore been necessary to use in traveling between these points. This new trail is approximately 8 miles in length, is built to a full width of 4 feet, provided with necessary drainage facilites, and is constructed on easy grades.

2. The Ten Lakes Trail from the Yosemite Creek bridge, on the Tioga road, to the Ten Lakes Basin, on the rim of the Grand Canyon of the Tuolumne, via Yosemite Creek, was also constructed during the past year. This trail, 8 miles in length, is constructed on exceptionally easy grades and opens up a country of unusually scenic interest long advertised by the Sierra Club, and fills the long-felt want of a direct trail from Yosemite Falls to the rim of the Grand Canyon of the Tuolumne. It is of interest to note that by leaving this newly constructed trail a short distance south of the Ten Lakes Basin there is a feasible route for a trail to the bottom of the Grand Canyon of the Tuolumne, whence a trail could also be constructed through Pate Valley, thereby connecting the northern park region directly with Yosemite Valley. The extension of this trail, as above noted, into the northern part of the park is one that will undoubtedly be demanded as early as conditions will permit, and its construction should be kept in mind as a very necessary after-war project.

3. The third trail to be constructed during the past year is the foot trail from a point near Camp Curry to Glacier Point along the route of what was formerly called the Ledge Trail. Prior to the construction of this trail hundreds of people annually scrambled from the floor of the valley up the talus slopes and through the steep ravines immediately back of Camp Curry in order to avoid the longer trip by the horse trails to Glacier Point and to avoid the dust always encountered on them during the summer months.

The journey was always hazardous, and fatal accidents have occurred, in spite of which, however, the trip continued to be made regardless of safety both by young and old. In view of this it was considered, therefore, feasible to build a trail which, although steep, would be entirely safe, at the same time affording a short route to the point. It was accordingly constructed, is now safe and easily passable, and is less than 2 miles in length

BRIDGES.

As has been noted in previous reports all of the eight bridges over the Merced River and its tributaries in Yosemite Valley with the exception of the Pohono and El Capitan bridges at the lower end of the valley are antiquated structures which no longer meet the requirements of modern transportation. Congress has authorized the construction of a new bridge on the site of the Sentinel bridge which will be constructed of reinforced concrete during the fiscal year 1919. The construction of this bridge will relieve the situation immensely, as the bulk of the heavy loads would naturally cross the river at this point, and long detours, which it has been necessary heretofore to make, will be avoided. Estimates have also been made for the construction of a new bridge on the Stoneman bridge site to replace the present wooden truss which has been in existence for 10 years, and which has during the past year become so weakened that it has been necessary to support the bridge beams by temporary piers. This relief would in any case be only temporary, but it has been particularly so in this case, since during the high water it was impossible to hold the supporting piers in place, with the result that they were washed away, leaving the bridge in such a weakened condition as to make it necessary to prohibit the moving of heavy loads over it. This is the only new construction for which estimates have been placed before Congress with the exception, of course, of an estimate for the completion of grading of the El Portal road, and it has been made with the feeling that it is an essential piece of construction work which should be provided for in the best interests of the administration of the park.

BUILDINGS.

Aside from the construction of three cottages for the housing of operators at the new power plant and the erection of a building to be equipped and used as a machine shop near the site of the Government shops and barns, no new buildings were constructed. The structures above mentioned are simple affairs, but substantially built and attractive, and will serve the purposes for which they were erected for many years to come.

ELECTRICAL SYSTEM.

The most important item in connection with the operation of the park electrical system and in fact, strictly speaking, probably the most important project heretofore undertaken in the park, has been the completion during the past year of the new 2,000 kilowatt hydroelectric plant located on the Merced River about 1 mile below the Pohono bridge. The plant consists of a log crib diversion dam, with a concrete headworks opening into a 64-inch concrete pipe 400 feet long, which in turn joins a 54-inch redwood stave pipe which extends a distance of nearly 6,000 feet along the north slope of the valley wall, where it empties into a steel-pressure pipe of the same diameter, which delivers the water to the turbines under an effective head of 330 feet. The power house itself is an attractive reinforced concrete structure equipped with two Pelton turbines, to each of which is connected a 1,000 kilowatt General Electric dynamo. These machines deliver current on a 3-phase system over an iron-wire transmission line extending from the power house to a main distributing point near Yosemite Village. This project was completed under three congressional appropriations of July 1, 1916, June 12, 1917, and March 28, 1917. The allotment made on the latter date was for a sum of $3,500 authorized for expenditures from park revenues rather than as a direct appropriation. The total cost of the plant was $212,000, and it was under construction continuously from August, 1916 to June, 1918. The plant was first operated on May 28, 1918, and has been in almost continuous operation since that date with excellent results. It is a modern up-to-date plant, equipped with the highest class of hydroelectric machinery, and should fill the needs of the Yosemite Valley for a generation. On September 7, 1918, although the plant had been in operation for some time, it was officially dedicated to the late Henry Floy, electrical engineer of New York City, whose earlier studies and reports and testimony before the House Appropriations Committee were contributing factors toward securing the initial appropriation for the construction of the plant.

With the opening of the new plant in May, the old Happy Isles plant, which had supplied the electrical needs of the valley since 1902, but which had become wholly inadequate because of the greatly increased electrical demands, was closed down after having operated 24 hours daily for the previous 11 months of the year. Plans are now under way for the removal of one or both units of the Happy Isles plant to the Sequoia National Park for installation and operation at the Giant Forest.

TELEPHONE SYSTEM.

Notable extensions and improvements of the telephone system have been made during the present year. The installation of a new 100-line switchboard, together with the old 50-line switchboard, gives the system a capacity of 150 lines, about 75 of which have been in use during the past season. The additional 75 lines leaves an opportunity for the extension of the service as necessity demands.

In November, 1917, an arrangement was made with the Pacific Telephone & Telegraph Co., by which the Government acquired title to the long-distance and telegraph lines between Yosemite Village and El Portal. These lines were connected directly to the park switchboard, so that under present conditions long-distance and telegraph service may be had directly from any telephone in the park. During the winter months telegraph business is handled over the long-distance wire. During the summer months, however, when business is heavy this is not feasible, and messages are handled by the Morse key by an operator employed by the park service during that period. These additions and extensions have resulted in a greatly improved long-distance and telegraph service, and also in more than a 100 per cent increase in long-distance and telegraph business.

The telephone system now consists of a 150-line switchboard, 75 lines of which are in use, and approximately 200 miles of telephone line, approximately 100 miles of which are metallic circuits of No. 9 wire, the remaining lines being ground circuits of No. 9, No. 12, or No. 14 iron wire.

WATER SUPPLY.

The springs situated near Happy Isles have for several years failed to contribute a sufficient water supply for park uses during the months of low water. With view to at least partially rectifying this condition, an auxiliary water supply was installed in the autumn of 1917. This consists of a collecting reservoir 20 by 6 by 12 feet deep, located about 30 feet in elevation below the present springs, and which collects water which has heretofore been wasted through filtering out through the talus slope below the springs. At this reservoir there was installed a 3-inch centrifugal pump connected to an electric motor, by means of which water is pumped from the collecting tank back into the main spring. Both the spring and the reservoir are equipped with electrically-controlled float switches, thereby making procedure of the pumping of water from the collecting tank to the springs automatic; that is, with a certain lowering of water in the springs the float switch in the spring automatically throws the switch which starts the motor and the pump begins to operate. When the spring has been filled, the same float switch opens the switch and the pump is stopped. Similarly the float switch in the collecting tank is so arranged that should the water in the collecting tank become too low for pumping, the switch operating the pump is automatically thrown and the pump stopped. In addition to this installation a pressure valve was also installed near the old power house which is so adjusted that in case the spring, combined with the auxiliary supply, is insufficient to meet the demands for water, the river water is automatically turned into the mains. All of this mechanism has operated continuously since its installation in a most satisfactory manner. It is still, however, to be noted that even with this additional supply there will be times during the low-water period, especially in unusually dry seasons, when it will be necessary to use river water for domestic and other purposes. While this system will undoubtedly supply the majority of the needs of the park for a few years, the permanent water supply is still an unsolved problem, and one that will have to be given attention should business and travel, with the consequent increase of camp and hotel accommodations and the accompanying increased demands for water, continue to increase from year to year as everything seems to indicate will be the case when normal conditions will have again been restored.

SANITATION.

The method of handling the sanitary situation in Yosemite has not been changed from that applied in former years. Each of the camps and hotels have their own individual sewage systems, some of which are fairly satisfactory, some of which are wholly inadequate and consist of practically nothing more than cesspools, and none of which are or can be entirely adequate. The disposition of sewage from the village and the Government-owned buildings is, unfortunately, handled in a no less unsatisfactory manner than that of the camps and hotels operated by the concessioners, in spite of improvements made during the past year in the way of additional cesspools. This condition will continue to exist undoubtedly until such time as funds are made available for the installation of a complete sewage system to meet the demands of the entire valley. When the time comes for such an installation, in order that the whole question of sanitation in Yosemite Valley may be disposed of once and for all, the question of the installation of an incinerator for the burning of garbage and other refuse should be given consideration and included in the new system.

MEDICAL SERVICE.

The Yosemite medical service continued in operation under the concession granted to Dr. Joseph S. Brooks, of San Francisco. During the period July 1, 1917, to June 30, 1918, 3 deaths, 118 accidents, 56 hospital cases, 1,968 office calls, and 1,413 house calls were reported.

Of the accidents reported nearly all were of a minor nature, and were suffered principally by employees of the service and concessioners in the exercise of their duties.

The deaths reported in the park during the year occurred as follows:

July 22, 1917, Stanley Eugene Tedrow, age 11 months, infant son of Clarence W. Tedrow, Government employee. Death caused by bronchial pneumonia.

August 30, 1918, M. Lee, age 33 years, employed as laborer on power-plant construction. Death caused by accidental falling into Merced River.

December 30, 1917, Caroline Paull Fiske, age 63 years, wife of George Fiske, pioneer photographer of Yosemite Valley. Death due to cancer.

FOREST FIRES.

In spite of the fact that the past year was an exceedingly dry one and although a total of 84 fires were reported during the year, burning over an area of some 1,800 acres, the amount of damage actually caused by forest fires was comparatively small. I believe this small loss can be attributed to the greater effectiveness of our patroling system, the effort each and every one of the rangers made to prevent fires getting under headway, and their willingness to fight them hard and faithfully once they had gained momentum. Only five of the total number of fires reported gained any headway at all, and these were so controlled as to prevent them, for the most part, from spreading to the heavy timber, with the result that in most cases nothing but underbrush was burned. It is of interest to note that by far the largest portion of these fires were started by lightning, while in only a few cases could their origin be attributed to carelessness of individuals.

In connection with fire-prevention methods there have been established 20 fire stations along the roads and trails throughout the park where necessary fire-fighting tools and equipment are kept and where they can be readily obtained for immediate use in the case of a fire in the vicinity of any of the stations. These stations have undoubtedly been a very valuable factor in preventing the spreading of forest fires, and it is proposed to make still more extensive use of them for fire prevention from year to year.

While there have been no forest fires of any consequence on the floor of the Yosemite Valley for many years, it is due to the fact that fires once started are more quickly discovered than elsewhere, and being near the center of the greatest activity in the park assistance can more readily be secured than elsewhere, rather than because of the existing conditions, for it is true that, particularly in the lower end of Yosemite Valley, conditions exist which would make the controlling of a large fire once well started almost impossible, because of the presence of the very extensive thickets of underbrush. As long as these thickets exist, they will constitute a menace to the timber stands as they will always be fire hazards of the first order. The elimination of these thickets is in itself no small project, but an item that should be given consideration with view to protecting the existing timber stands The clearing of thickets and underbrush should therefore be considered as one of the essential items upon which park funds should be expended.

INSECT CONTROL.

The control of insect depredations on the park forests, which has been carried on quite extensively during the past four seasons, has now become a part of our regular park operation. Although during the past year labor conditions were such as to preclude the possibility of extensive work along this line, such work as was feasible was carried on under the direct supervision of Mr. J. E. Patterson, entomological ranger, who was assigned to Yosemite National Park by the Bureau of Entomology for this purpose.

Mr. Patterson finds that the sugar-pine and yellow-pine areas have readily responded to previous control work to such an extent that during the past year it was necessary to do but comparatively little cutting and burning. The result of this work in the sugar-pine and yellow-pine belts is that these areas stand exceptionally clean and free from insect-killed or infested trees.

In the higher altitudes, however, in the lodge-pole pine belts, particularly in Cathedral and Tenaya Creek Basins, the forest have not so readily responded to treatment, and the labor situation has prevented the prosecution of control work on these areas during the past year almost entirely. It is of interest to note that in spite of lack of intensive control work during the past year, there seems to be no real extensive aggression of infestation on to new forest areas, but that the conditions remain essentially the same as during the previous year. It appears evident that in spite of the work that has been done in previous years the lodge pole areas above mentioned will be entirely denuded of live timber and that the best results that may be hoped for in the continuation of the control work in lodge-pole belts is to prevent extension of the depredations to new areas. It is believed that by close attention each year this can be prevented and the loss of timber confined to the areas already attacked.

MOSQUITO CONTROL.

The sluggish streams of Yosemite Valley, bordered as they are by irregular banks and subject as the valley is to flooding, with the accompanying pools of backwater, ideal conditions exist each spring for the propagation of mosquitoes. This period of propagation covers generally about three weeks, which period is, unfortunately, usually at the beginning of the height of the travel season. The tourist travel each year shows a decided falling off at the beginning of the mosquito period and the loss in travel as a result of the pests can scarcely be estimated as the publicity distributed by outgoing visitors during that period has an effect on travel which extends very often far beyond the mosquito season. In this respect, the spring of 1918 was particularly bad as the pests seem to have bred in far greater numbers than ever before and their activities were more general throughout the valley than in previous years. That the mosquito nuisance is subject to control goes without saying as effective measures have been taken against the pests in other localities throughout the country. Practically nothing has every been done in this park toward the eradication of the pests as in general heretofore the period of activities was shorter and far less intensive. The results of the past season, however, have positively proven the necessity for a campaign against the mosquitoes and plans are under way for undertaking control measures during the coming year. The two remedies which have proven most effective elsewhere in controlling the nuisance, namely, drainage and the application of oil, will be used, and it is believed that if these measures are taken each season the suffering and inconvenience to the public noted during the past season can and will be avoided.

TIMBER OPERATIONS.

Timber operations on both private and Government owned lands in the park were continued throughout the year by the city and county of San Francisco in their development of Hetch Hetchy and Lake Eleanor projects and by the Yosemite Lumber Co. operating in the southern portion of the park.

The city and county of San Francisco in connection with their Hetch Hetchy water project operated a sawmill on their canyon-ranch property which is located in section 32, township 1 north, range 20 east, Mount Diablo meridian. In this operation they employed an average of about 40 men during the cutting season. They sawed 1,655,461 feet b. m. of lumber, of which amount 1,548,689 feet b. m. was cut from Government lands involved in the so-called Dudley exchange, mentioned in my last years' report, and located in sections 31 and 32, township 1 north, range 20 east, Mount Diablo meridian, and in section 6, township 1 south, range 20 east, Mount Diablo meridian. This makes a total cut to date of 2,010,052 feet b. m. of lumber of the 4,000,000 feet which the city will be allowed to cut from Government lands in exchange for the 320 acres of land and timber known as the Dudley lands. Practically all slashings and débris resulting from the cutting during the past season have been cleaned up and burned.

In connection with the construction of the Lake Eleanor Dam the city also operated a small sawmill near Lake Eleanor on city-owned lands to be submerged. In this operation they sawed about 750,000 feet b. m. of lumber which was utilized in the construction of their Lake Eleanor camps and for forms in the construction of the dam.

In the development of the Hetch Hetchy project, of which the Lake Eleanor operation forms a part, the city's work during the past year was confined principally to the construction of the Lake Eleanor Dam. The work of construction of the dam was started on September 1, 1917, and was on June 30, 1918, about 70 per cent completed. An average force of about 150 men was employed during the working season. The storing of water back of the dam was begun on June 20 and at its maximum height reached an elevation of about 40 feet on the dam. This water was drawn off and used for the development of power at the newly constructed Early Intake Power House.

It is to be noted that in spite of the fact that it is always desirable in the case of flooding a reservoir to have all of the timber on lands to be submerged removed before flooding, this has not been done in the case of the flooding of the Lake Eleanor Reservoir. The failure to do this by the city was attributed to the difficulty of securing sufficient labor at the time, but as the water was to be allowed to stand in the reservoir only during the summer of 1918 the city was allowed to pursue this course on the condition of their agreement to cut and remove such submerged timber with the draining of the reservoir during the following autumn. It is to be hoped that this guarantee will be met and that before the reservoir is flooded another season all timber and débris on the lands to be submerged will be removed, thereby eliminating further danger of stream pollution which is bound to result unless these steps are taken. A considerable amount of damage has already been done in the depletion of fish life as the result of already polluted waters, and it is of course essential that this be stopped before extensive damage results.

PATENTED LANDS.

As noted in my last year's report, by various exchanges of Government-owned timber, for land and timber owned by the Yosemite Lumber Co. and the city and county of San Francisco, nearly 7,000 acres, or more than 80 per cent of the privately owned lands existing in the park at that time, were acquired by the Government. During the past year no further exchanges were made, activities in this direction being confined to clearing up the various details involved in the actual transfer of the lands to the Government.

Within the boundaries of the park there now remains approximately 10,800 acres of privately owned lands, or approximately 1¼ per cent of the total area of the park. It is very essential to the best park administration that some means be evolved for the acquisition of the remainder of these privately owned lands either by direct purchase by the Government or by exchange.

By the acquisition of the approximately 7,000 acres above mentioned by the Government a long step has been taken toward the protection of the scenic beauty of the roads within the park. All of the Wawona and Glacier Point roads, as a result, traverse Government-owned timberlands, thus assuring that the timber along these roads will never be cut. Likewise the bulk of timber has been preserved along that part of the Big Oak Flat road lying within the park.

Two other sections of road, although not within the boundaries of the park, but the preservation of which are of importance to the park, are of exceptional interest and may be touched upon in connection with the question of patented lands as affecting park interests.

These two sections are, namely, that part of the Big Oak Flat Road between the western park entrance near the Tuolumne Grove of Big Trees and the crossing the South Fork of the Tuolumne River and that portion of the Tioga Road between the Aspen Valley Park entrance and the crossing of the South Fork of the Tuolumne River. These two sections lead to two of the main park entrances and traverse some of the most beautiful sugar and yellow-pine timberlands in the State. All of the timber and land along these roads are privately owned and are doomed to destruction within the next few years when lumber operations by the present owners will have been initiated unless in the meantime preventive measures are taken. It would be a crime to have these roads denuded of their timber screen, as has happened on the Wawona Road between Wawona and the Mariposa Grove of Big Trees, and it is to be hoped that public sentiment may be so aroused that serious efforts will be directed toward evolving some scheme toward the preservation of the timber. I am certain that the present owners are public spirited enough to recognize the desirability of seeing this timber preserved, but it is doubtful if they would see fit to sacrifice their own interest to the extent of transferring the lands to the Government without compensation. They would undoubtedly, however, be willing to consider any exchange proposed whereby they could receive timberlands elsewhere accessible to their operations of equal value. This problem might be handled in any one of three ways:

First. The Department of Agriculture might be inclined to consider the question of exchanging other Government-owned timberlands of equal value for those under consideration;

Second. The State of California might be interested to the extent of either purchasing sufficient of these timberlands to protect the roads or it might be able to exchange other lands of equal value for them; or

Third. The lands and timber might be acquired by direct Government purchase.

It is hoped that organizations such as the Sierra Club and other kindred organizations throughout the country, automobile associations, and other public-spirited organizations may be interested in this effort to such extent as to launch a campaign looking toward the acquisition of these lands either by the Federal or State Government, thereby assuring their permanent preservation.

RANGER SERVICE.

Although the operation of the draft law and enlistments operated strongly to deplete the ranger force built up during the previous year, a sufficient number of the older men were not affected to enable us to maintain a reliable force as a nucleus around which to build up a summer organization. Although constant changes were the order among our temporary appointees, we were fortunate in securing, on the whole, reliable assistants for handling the traffic during the heavy tourist season. It is notable that almost without exception the older men, realizing the situation, accepted their greater responsibilities with a will and made an even greater effort than before to keep the ranger organization going.

It is also of interest to note that from year to year we are gradually securing more cooperation from the public, who seem to have combined in an effort to assist the park organization in the enforcement of the park rules and regulations. This is indeed very gratifying to the park organization, as the closer the cooperation between the park and the public the less difficulty we have in maintaining order. I can not help but attribute much of this tendency on the part of the public to the manner in which they have been handled by the ranger service and to the skill and tact with which the rangers have handled the various problems of the enforcement of regulations with which they have been confronted.

INFORMATION BUREAU.

The bureau of information was operated as in past years at the superintendent's office, at which place campers were registered, park maps were kept on sale, and free Government literature distributed, as well as the literature of the various concessioners operating in the park. A lost-and-found department was also maintained in connection with this bureau, where a large percentage of lost articles recorded were returned to their rightful owners. This bureau has been a decided success and of immeasurable value to park visitors, and every effort has been made to have it so handled that all information is given without prejudice or discrimination, and the public has been quick to realize that information received at this bureau is trustworthy and reliable and have accordingly made the greatest use of it.

In addition to the park information bureau, and operated in conjunction with it, the California State Automobile Association was given permission to establish a Yosemite branch office here. During the months of heavy tourist travel they kept a representative, whose duty it was to distribute the association's road maps and to distribute road information of all kinds as applying to road conditions throughout the State. This information was given gratuitously to all, irrespective of whether those receiving the information were members of the association or not. This addition to our information bureau has worked, I believe, to the advantage of the park, of the motoring public, and of the California State Automobile Association as well.

TRAVEL.

At the beginning of the 1918 season, with the very notable concentration of effort throughout the country on war work, conditions did not appear conducive to anything like a normal travel to the park. Increased passenger rates on the railroads and other curtailments of railroad travel made it appear not only possible, but highly probable, that the park would suffer a very substantial decrease in the number of visitors during the 1918 season. That we have been able to record a very substantial gain in automobile travel and a no greater decrease in railroad travel than was to be expected is agreeably indicative of the feeling of the public as regards its interest in Yosemite as a place to spend their recreational periods, which periods are considered fully as essential as ever as a factor in building up mind and body for the tasks which confront all persons in assisting in the winning of the war.

With the opening of the Wawona Road in the month of May automobile travel started and showed an increase for each month throughout the season over that of the corresponding months for any previous year.

Motorcycles were admitted to the park for the first time, but the number reporting was distinctly less than had been anticipated. It will be recalled that during previous years a very considerable publicity was given to the question of allowing motorcycles on the park roads, and demands were general for motorcycle organizations throughout the State to be permitted to enter. While it had been contended by the Park Service officials that motorcycles would have considerable difficulty in negotiating the roads entering the park, this claim was refuted by motorcycle enthusiasts. That the service was right in its contention, however, I believe has been proven by the fact that so few motorcycles have reported since permission was given them to enter, as it is unquestionably true that numbers of motorcycles have unsuccessfully attempted to reach Yosemite, and it has only been those of high power and particularly substantial construction that have been able to negotiate the roads and report in. It is to be noted, however, that no difficulty has been encountered by the park organization in handling the motorcycle situation to date, and no reason exists why the experiment of permitting motorcycles in the park initiated during the past year should not be continued.

The following tables show the total travel to the park for the year ending October 12, 1918, as compared with that recorded for the previous year:

Automobiles and motorcycles.

Entrance.	Road.	Number of automobiles.	Number of people.	Number of motorcycles.	Number of people.
SEASON 1917.					
Alder Creek	Wawona	3,604	12,647	(1)	(1)
Crane Flat	Big Oak Flat	1,394	4,911	(1)	(1)
Merced Grove	Coulterville	62	232	(1)	(1)
Aspen Valley	Tioga	559	1,691	(1)	(1)
Tioga Pass	do	883	2,915	(1)	(1)
El Portal	El Portal	17	55	(1)	(1)
Yosemite	Various	2	5	(1)	(1)
Total		6,521	22,456	(1)	(1)
SEASON 1918.					
Alder Creek	Wawona	3,834	14,037	45	62
Crane Flat	Big Oak Flat	1,904	6,633	11	19
Merced Grove	Coulterville	37	123		
Aspen Valley	Tioga	822	2,574	2	3
Tioga Pass	do	970	3,162		
Yosemite	Various	54	170	3	4
Total		7,621	26,699	61	88

	1917	1918
Travel by auto stages other than via El Portal Road	2,603	2,330
Travel via Y. V. R. R. and El Portal Road	8,612	3,894
Travel by wagon, horseback, or on foot	839	516
Total travel other than by private cars and motorcycles	12,054	6,740

(1) None.

Summary.

	1917	1918
Travel by private automobiles	22,456	26,699
Travel by motorcycles	None.	88
Travel by auto stages	2,603	2,330
Travel by wagons, etc	839	516
Travel by Y. V. R. R	8,612	3,894
	34,510	33,527

FISH AND GAME.

Good fishing grounds are becoming more and more a requisite of mountain recreation places. It is doubly essential in a national park where hunting is not permitted and where, accordingly, the sportsman has recourse to fishing only, as a diversion from hiking the trails and driving the roads, that streams be well stocked and the supply of fish be maintained at least equal to the demands of the anglers.

Isolated as Yosemite is from sources of supply of young fry, and rugged and expansive as its mountain areas are, the transportation of fry and stocking of its streams are fraught with difficulties of no small proportions. The result has been that in the areas most accessible to tourists it has not been feasible to keep the streams and lakes stocked as they should be. All that it has been possible or practicable to do along these lines, however, has been done, and each year the rangers, giving such times as they can from their other duties, are engaged in transplanting relatively well-grown fish from lakes and streams already stocked to those where none or only few exist. This has been the means of starting fish propagation in lakes and streams so isolated as to make the transportation of young fry to them impracticable and thereby opening new fields to anglers.

The more extensive stocking of the readily accessible lakes and streams has been accomplished through the cooperation of the State fish and game commission who have furnished during the past year alone some 250,000 young fry which have been planted in the Merced River, Yosemite Creek, and Tanaya Creek, in Yosemite Valley, and numerous streams and lakes along the Tioga Road and in the Ten Lakes district recently made accessible by the construction of a new trail from Yosemite Creek on the Tioga Road.

Even this, however, has only given us a start and in order that Yosemite might offer to its thousands of enthusiastic visitors this one sport at its best, many times the effort already made is necessary in order to obtain fully satisfactory results. Its streams and lakes should be stocked to the limit so that our fishing regulations might be modified at least to compare with those applied by the State fish and game commission to adjoining areas. Fishing could then be permitted for supplying the camps and hotels, which item alone in these times of a rigid food conservation program should be reason enough for taking steps toward increasing the facilities for a more extensive stocking of Yosemite's lakes and streams.

In line with this thought the Service concluded a contract with the California State Fish and Game Commission during the past year leasing to the commission a site near Happy Isles for the erection of an appropriate building for a fish-hatchery. Plans of the plant are being made, and it is highly probable that in the near future construction work will be started. Its completion will assure a stocking of Yosemite's lakes and streams within a few years to such an extent that all visitors will be able to avail themselves of the opportunity to enjoy fishing to the limit of its possibilities, and even those who do not have the good fortune of making a catch for themselves will be able to have them served on their hotel or camp breakfast table.

Deer, bear, and bird life, according to ranger reports, continue to increase, which goes to substantiate the observation that predatory animals are on the decrease. Lions, coyotes, and other predatory animals destructive to bird and game life are apparently becoming fewer, thus making Yosemite more and more a bird and game refuge.

There is, however, one alarming feature with reference to game conditions which I feel should not be omitted from this report. I called attention last year to the fact that there appeared to be a decrease in the number of deer in the areas opened to grazing, with a corresponding increase in numbers in areas where grazing was not permitted. This is in a measure true at the present time, but with the extension of the grazing areas during the current season and the admission of nearly 100 per cent more cattle, reports indicate that the deer are in unusually poor condition, suffering apparently from lack of feed. While the production and conservation of beef is the vital problem at this time, the fact must not be lost sight of that the protection of our game is of importance, and the latter should not be too far deprived of their supply of feed. Future generations would not be thankful for such an oversight.

GRAZING.

With the continuation of war conditions and the accompanying demand for intensive conservation of food products the question of the utilization of park lands for grazing purposes became again a subject of discussion between the Service and the grazing interests during the latter part of the winter of 1917–18. It was decided to authorize the grazing of cattle, only, on essentially the same areas opened to grazing during the previous year. On the argument that the Government should enjoy a reasonable share of the profits accruing through the privileges granted to the stockmen, a rate of $1.50 per head was fixed as the proper fee to be charged. On this basis permits for approximately 5,000 head of cattle, the number allotted to the areas opened, were issued prior to June 1, 1918. As there was still a demand for grazing privileges, strong representations were made by the California Cattlemen's Association urging the opening of additional areas and the reduction of the fee. The Service of course willingly gave consideration to these requests, but placed itself squarely on the policy that, since the beginning of the war, grazing privileges had been authorized only as a war measure, there should be some guarantee, in the case of further extension of such privileges, that the cattle interests would in no way consider the rights granted during the war as extending beyond that period and that they would recognize the park for park purposes only after the emergency had passed, thereby leaving the Service free to fix its after-war grazing policy without interference by them.

Accordingly after several conferences with representatives of the Food Administration and the cattlemen's association, additional grazing areas, bringing the total up to about 70 per cent of the entire park area, were opened and permits for approximately 4,000 additional head of cattle were granted at the rate of 60 cents per head, thereby bringing the total number of cattle for which permits were issued up to about 9,000 head. The cattlemen's association was authorized to select the permittees and no permits were issued except upon the sanction of that organization. This action was taken on the strength of the assurances contained in a resolution passed by the California Cattlemen's Association in their meeting held at Davis, Cal., on June 28, 1918, which is quoted herewith:

"Whereas as a result of the feed crisis in this State the Department of the Interior through the Director of National Parks has made available the grazing within the Yosemite and Sequoia National Parks for the term of the war, and

"Whereas in order that those cattlemen most needing it may have access to the grazing privileges, the adjudication thereof has been placed in the hands of the California Cattlemen's Association, which in turn is securing its information through the local live-stock associations; Therefore be it

"*Resolved*, That the various live-stock associations of California, through their delegates in convention assembled, hereby recognize that all permits heretofore issued, or to be issued for grazing in Yosemite and Sequoia National Parks have been granted as a result of war conditions only; and that no claim shall be made for extension after the war of any privileges so granted;

"*And further*, That when the war emergency shall no longer exist, it is agreed that our influence and aid will be lent in preventing a continuation of grazing in the Yosemite and Sequoia National Parks on other than privately owned lands, and that the uses of the parks will be recognized as for park purposes only.

"This is a true copy.

"(Signed.) L. A. NARES, *Chairman*."

This seems to place the grazing problem, as it applies to Yosemite National Park, on a more solid footing than ever before, and the Service by granting extension of grazing privileges under these conditions is rendering a notable service to the country, and is at the same time fortifying itself against encroachment upon park interests when in the future conditions will have reverted to normal.

WAR-FUND DONATIONS AND SUBSCRIPTIONS.

While immediately concerned with the operation of the park as the work in hand, the Service employees have not overlooked their duty to the Government in its supreme effort to win the war, and they are credited with 26 men in the military and naval forces of the United States; subscriptions to the first three liberty loans of $23,050; war-savings stamps subscriptions totaling $7,330; subscriptions to the American Red Cross in the sum of more than $2,000; besides considerable donations to the local Red Cross branch, Y. M. C. A., Knights of Columbus, Salvation Army, and other similar war-relief organizations. Not only have they met the full amount of the quota assigned in these various drives, but have in each case doubled and even quadrupled that amount.

I am, indeed, glad on behalf of the park organization to be able to report this generous and enthusiastic response to our country's appeal.

CONCESSIONS.

The following is a list of concessioners operating in the park during the season of 1918:

Concessions for the season of 1918.

Name.	For what granted.	Expiration.	Annual rental.
E. N. Baxter	Sale of curios, photos, etc	Dec. 31, 1918	$75.00
George Fiske	Studio, photographs, etc	do	20.00
Mrs. John Degnan	Delicatessen store	do	[1] 250.00
H. C. Best	Studio, photographs, etc	do	[1] 250.00
A. C. Pillsbury	do	do	[1] 250.00
J. T. Boysen	do	do	[1] 250.00
D. J. Foley	do	do	[1] 250.00
Big Trees Auto Stage Co	Automobile stage line	do	1,000.00
Yosemite Stage & Turnpike Co	do	Dec. 31, 1931	100.00
Trustees of Yosemite school district	Lease of site for schoolhouse	Dec. 31, 1936	(2)
Curry Camping Co	Public camp	Dec. 31, 1921	2,000.00
Dr. Joseph H. Brooks	Hospital	Apr. 30, 1918	(2)
Desmond Park Service Co.[3]	Hotels, chalets, inns, camps	Dec. 9, 1935	(4)
Do	Store and dairy	Dec. 9, 1925	(4)
Do	Transportation	Dec. 9, 1935	(4)

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[1] Permit fee fixed at 4 per cent of gross revenues, $250 minimum.

[2] None.

[3] Desmond Park Service Co. operating under name of Yosemite National Park Co., Shaffer Bros., lessees, during season of 1918.

[4] 25 per cent net profit first 5 years, 50 per cent net profits thereafter. Subject to change to 4 per cent of annual gross revenues after 2 years from date of contract.

Lease, special-use, and water-power permits under act of Feb. 7, 1905, segregating lands from Yosemite National Park and placing same in Sierra and Stanislaus National Forests.

Period of concession.	Name of concessioner and privilege granted.	Compensation exacted.
Indeterminate period..	Yosemite Valley R. R. Co. Lease dated Sept. 5, 1905, grants right to construct and operate electric railway along Merced River to park boundary. Rate may be readjusted and fixed by President of the United States after expiration of first 3 years under lease.	[1] $1,000
Do.	Yosemite Valley R. R. Co. Special-use permit issued by Forest Service, approved Feb. 7, 1908, by S. J. Flintham, acting forest supervisor, authorizes construction of diverting dam, pipe line, and water tank for conveying water from a spring and storing in tank for use in operating company's electric road. All timber cut to be paid for under timber-settlement regulations of Forest Service.	5
Do.	City and county of San Francisco, Cal. (transferees of Sierra Ditch & Water Co.). Right of way for reservoir site (known as Cherry Valley Reservoir site), comprising 630 acres of land in the Stanislaus National Forest, under lease granted July 30, 1908, to Sierra Ditch & Water Co. All timber cut to be paid for at stipulated rates from $1.50 to $5 per thousand feet, according to kind of timber cut. NOTE.—This right of way was relinquished by the city and county of San Francisco on Nov. 3, 1917, in view of which all charges accruing under this lease after July 30, 1917, were remitted by letter of the First Assistant Secretary of Dec. 18, 1917.	[1] 945
Do.	Yosemite Lumber Co. Special-use permit, approved by district forester, Forest Service, June 27, 1911, for right to construct logging railroad and inclined tramway in Sierra National Forest, for removal of timber adjacent to company's road. All timber used to be paid for at rate to be fixed by forest supervisor, Sierra National Forest, which shall correspond with prevailing stumpage rates charged on said national forest when timber is cut. Stipulations signed by company June 20, 1911, and approved June 27, 1911, by District Forester F. E. Olmstead, accompanying the permit, require annual payment (outside of charge for live and dead timber, standing and down, cut, damaged, killed, or destroyed along right of way, title to which at time of cutting is in United States) of $1,200 on demand therefor being made by the Secretary of the Interior.	[1] [2] 1,200
Do.	Yosemite Lumber Co. Special-use permit, approved Nov. 22, 1911, by E. G. Dudley, acting forest supervisor, Sierra National Forest (Forest Service), authorizes construction and operation of telephone line along inclined tramway and logging railroad in Sierra National Forest.	[3] 5
Do.	Yosemite Lumber Co. Special-use permit, approved Nov. 22, 1911, by E. G. Dudley, acting forest supervisor, Sierra National Forest (Forest Service), covers right of way for, and authorizes construction and operation of, pipe line about one-half mile long from spring on lands segregated from park (in Sierra National Forest) for purpose of piping water from company's inclined tramway and logging railroad to supply boilers of steam-hoisting plant, etc.	[3] 10
50 years [4].	Merced River Electric Co. (project "A"), final water-power permit granted by Agriculture Department (Forest Service), Apr. 11, 1911, running for 50 years, unless sooner revoked by that department, for right of way for diverting dam and power conduit in Stanislaus National Forest. Annual charge over lands segregated from park based on 1,460 horsepower, at 10 cents per horsepower for first year, with increase of 10 cents per horsepower each succeeding year until maximum charge of $1 per horsepower is reached, annual charge thereafter being at latter rate. Stipulations signed by officers of company Mar. 21, 1911 (and accompanying above permit), provided that payment upon above basis should be made annually in advance from Jan. 1, 1912, permit, however, being approved Apr. 11, 1911, and first payment, $146, being made on June 7, 1911; this payment was applied on 1911 calendar year. Amount due for fourth year, 1914, 1,460 horsepower, at 40 cents; horsepower capacity subject to readjustment after expiration of tenth year.	584

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[1] Per annum, on demand of Secretary of the Interior.

[2] Value of all timber cut and paid for on right of way (payment of $406.56 made May 3, 1912, and $334.56 made Oct. 3, 1912), $741.12.

[3] Per annum, in advance.

[4] Unless sooner revoked by Department of Agriculture.

EXCERPT FROM ACT OF CONGRESS APPROVED DECEMBER 19, 1913, GRANTING TO THE CITY AND COUNTY OF SAN FRANCISCO CERTAIN RIGHTS OF WAY IN, OVER, AND THROUGH CERTAIN PUBLIC LANDS IN THE YOSEMITE NATIONAL PARK AND STANISLAUS NATIONAL FOREST ADJACENT THERETO.

Section 7 of the above act provided that for and in consideration of the grant by the United States, as provided for in this act, the said grantee shall assign free of cost to the

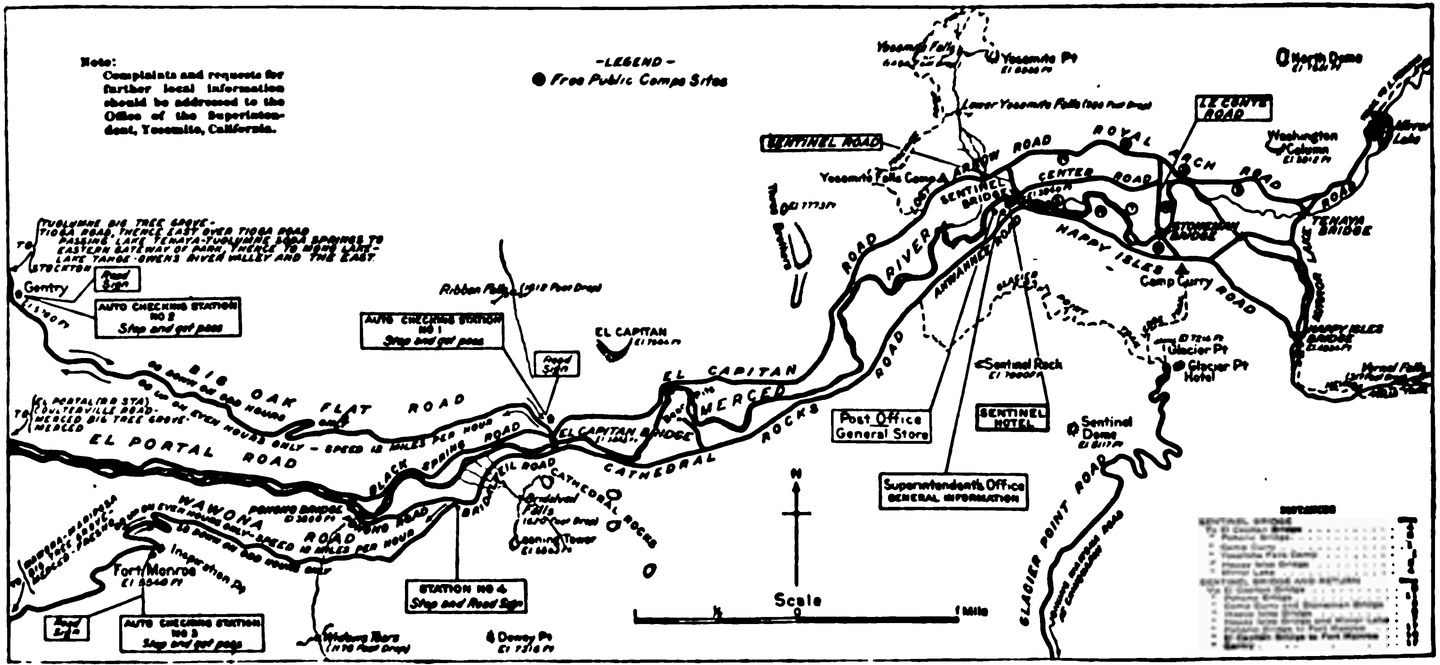

Note:
Complaints and requests for further local information should be addressed to the Office of the Superintendent, Yosemite, California.
-LEGEND-
● Free Public Camp Sites
TO TUOLUMNE BIG TREE GROVE-
TIOGA ROAD, THENCE EAST OVER TIOGA ROAD PASSING LAKE TENAYA-TUOLUMNE SODA SPRINGS TO EASTERN GATEWAY OF PARK, THENCE TO MONO LAKE-LAKE TAHOE-OWENS RIVER VALLEY AND THE EAST.
STOCKTON
Gentry
Road Sign
AUTO CHECKING STATION NO 2 Stop and get pass
LISNON
BIG OAK FLAT ROAD
GO DOWN ON ODD HOURS
GO UP ON EVEN HOURS ONLY - SPEED 12 MILES PER HOUR
TO EL PORTAL (R.R. STA.) COULTERVILLE ROAD. MERCED BIG TREE GROVE. MERCED
EL PORTAL ROAD
AUTO CHECKING STATION NO 1 Stop and get pass
Ribbon Falls (1612 Foot Drop)
Road Sign
EL CAPITAN El 7042 Ft
EL CAPITAN
EL CAPITAN BRIDGE
MERCED
CATHEDRAL ROCKS
BLACK SPRING ROAD
WAWONA ROAD
POHONO BRIDGE
GO DOWN ON ODD HOURS ONLY
GO UP ON EVEN HOURS ONLY - SPEED 10 MILES PER HOUR
Inspiration Pt
Fort Monroe El 5040 Ft
Road Sign
AUTO CHECKING STATION NO 3 Stop and get pass
STATION NO 4 Stop and Road Sign
Bridalveil Falls (620 Foot Drop)
Leaning Tower
Widow's Tears (1170 Foot Drop)
Dewey Pt El 7316 Ft
Cathedral Rocks
Three Brothers
Yosemite Falls
Yosemite Pt
Lower Yosemite Falls (320 Foot Drop)
SENTINEL ROAD
Yosemite Falls Camp
ROAD
RIVER ROAD
SENTINEL BRIDGE
ARROW ROAD
AHWAHNEE ROAD
Post Office General Store
SENTINEL HOTEL
Superintendent's Office GENERAL INFORMATION
Sentinel Rock
Sentinel Dome
GLACIER POINT ROAD
Glacier Pt
Glacier Pt Hotel
ROYAL ARCH ROAD
CENTER ROAD
HAPPY ISLES ROAD
Camp Curry
STONEMAN BRIDGE
LE CONTE ROAD
Washington Column
North Dome
Mirror Lake
TENAYA BRIDGE
MIRROR LAKE ROAD
HAPPY ISLES BRIDGE
Vernal Falls
N
Scale
0
½
1 Mile
DISTANCES

FIG. 4.—AUTOMOBILE GUIDE MAP SHOWING ROADS IN THE YOSEMITE VALLEY, YOSEMITE NATIONAL PARK.

United States all roads and trails built under the provisions hereof; and further, after the expiration of five years from the passage of this act the grantee shall pay to the United States the sum of $15,000 annually for a period of 10 years, beginning with the expiration of the five-year period before mentioned, and for the next 10 years following $20,000 annually, and for the remainder of the term of the grant shall, unless in the discretion of Congress the annual charge shall be increased or diminished, pay the sum of $30,000 annually, said sums to be paid on the 1st day of July of each year. Until otherwise provided by Congress, said sums shall be kept in a separate fund by the United States, to be applied to the building and maintenance of roads and trails and other improvements in Yosemite National Park and other national parks in the State of California. The Secretary of the Interior shall designate the uses to be made of sums paid under the provisions of this section, under the conditions specified herein.

Section 4 of the act provides that no timber shall be taken, cut, or destroyed within Yosemite Park or Stanislaus Forest, except as such may be actually necessary to construct, repair, and operate its reservoirs, dams, power plants, water power, and electric works, and other structures mentioned in the act, but that no timber shall be cut or removed from lands outside of the right of way until designated by Secretary of the Interior or Secretary of Agriculture, and the grantee shall pay the full value of all timber and wood cut, injured, or destroyed on or adjacent to any of the rights of way and lands, as required by either of said officers: *Provided*, That no timber shall be cut by the grantee in Yosemite Park except from land to be submerged or which constitutes an actual obstruction to the right or rights of way to any road or trail provided for in the act.

RULES AND REGULATIONS.

The rules and regulations promulgated and applied to the operation of Yosemite National Park during the past year have, on the whole, been entirely adaptable to the conditions existing and have been, I believe, quite satisfactorily enforced. The proportion of 34 arrests to the more than 30,000 people entering the park during the year would indicate the very little tendency on the part of visitors to violate the park rules. The bulk of the arrests were for violation of the speed regulations on the roads on the floor of Yosemite Valley, which brings up the question of whether the proper limit has been defined for travel on these roads. With the exception of the short stretch of road leading to Mirror Lake, the roads on the floor of the valley are just as safe for travel as the State highways, and I can see no logical reason why the same speed limits should not apply, namely, 30 miles per hour, and I would recommend that this change be made another year. Aside from this, I would suggest no alteration in the regulations as they now exist.

SEQUOIA AND GENERAL GRANT NATIONAL PARKS.

WALTER FRY, Superintendent, Three Rivers, Cal.

GENERAL STATEMENT.

The Sequoia National Park, set aside by act of September 25, 1890 (26 Stat., 478), and act of October 1, 1890 (26 Stat., 650), is located in Tulare County, Cal. It has an area of 161,597 acres and ranges in altitude from 1,100 to 11,900 feet. The General Grant National Park, set aside by act of October 1, 1890 (26 Stat., 650), is located one-half in Tulare County and one-half in Fresno County, Cal. It has an area of 2,536 acres and ranges in altitude from 5,250 to 7,631 feet. The Sequoia National Park derives its name and much of its interest from the presence of many large groves of "big trees" (Sequoia washingtoniana), and the General Grant National Park was thus named by reason of the "General Grant tree," so widely known for its size and beauty. Both of these parks are situated in the southern portion of California, about midway between the cities of San Francisco and Los Angeles, on the western slope of the Sierra Nevada, and contain an aggregation of the most magnificent mountain scenery to be found on the continent. The magnificent forests within their borders contain the greatest groves of the oldest and largest trees in the world.

Park headquarters are located at Giant Forest in Sequoia National Park, 19 miles inside the park line from the west entrance, during the summer season, and at a point 2 miles east of Three Rivers, 4 miles outside the park line from the south entrance, during remainder of the year. A telephone system connects both these headquarters with General Grant Park, long distance service at Three Rivers, and the various outpost stations throughout the reservations. A civilian force of 11 men as park rangers was employed in Sequoia Park and of 2 men in General Grant Park during the season of heavy traffic. Ten of these men were assigned to various outposts throughout the parks, and three men made it their special duty to care for the welfare of the traveling public and to see that sanitary measures and grazing regulations were properly enforced. The distance from Giant Forest headquarters to General Grant Park by road is 95 miles and by trail 32 miles, and from the Three Rivers headquarters by road 63 miles and by trail 34 miles. Lemon Cove, nearest railroad station from Giant Forest headquarters, is 40 miles, and from Three Rivers headquarters 10 miles.

The winter weather of 1917–18 was characterized by an unusual number of bright sunshiny days, defective rainfall, and temperature which averaged far above the normal; 11.91 inches of rain being recorded for the season over the lower elevations of the park, as against 18 inches that for normal. This is the lowest record for seasonal precipitation in the entire record of the parks. Snowfall in the higher elevations was also very light and practically all had melted away by July 15, other than that along the northern slopes of Silliman, Alta, and Vanderver Mountains, where snow remained in vast quantities throughout the year, thus maintaining the reputation of Sequoia National Park as containing a given area that is at all times covered with ice and snow. By reason of the light snowfall in the higher mountains, the water run off in all the park waters was lower during the summer season of 1918 than at any time before; in fact, about one-half lower than the lowest previously noted since park records have been kept.

TRAVEL.

Travel is permitted in the parks the year around, but on account of extreme depth of snow it is difficult to reach the higher scenic portions of the parks prior to the months of May or June of each year, and for this reason the 1918 open-park season was fixed from May 15 to October 10, on the former of which dates all park concessioners commenced operations.

On the 25th of May following the date of the park opening the Tulare County authorities closed to vehicle travel a certain section of the Lemon Cove-Three Rivers county road in the vicinity of Three Rivers, just west of the Sequoia Park, for the purpose of applying a concrete pavement to the road. As the result of closing the road, vehicle traffic to the park was entirely shut off, as this road is the only highway over which travel can enter the park from the valley below. This condition of affairs continued in effect until June 13 of the following month, when the road was again thrown open to travel by means of a detour, and park visitors commenced to come in gratifying numbers.

About one year ago Tulare County started in on the construction of a concrete-paved highway system over 200 miles in length, and for this reason many of the roads in the vicinity of the parks were torn up and in bad condition for travel during the open-park season; thus many thousands of visitors remained out of the parks, but the benefit that will be derived by park traffic in the future by reason of these improved highways is incalculable, as by next season, provided there is no interference, will see a system of completed concrete highways in California over 2,500 miles in length connecting up within very few miles of the entrances of both parks. There has been no let-up in the building of good roads throughout Tulare County during the past year, and a fixed, steady course of development over public-highway system has been vigorously pushed.

The aggregate number of persons making trips to the parks during the season of 1918 was as follows:

Sequoia National Park.

Sequoia National Park Transportation Co	300
Making park trips with private transportation:	
With automobiles, paid and complimentary, and on those roads where no fee is exacted	9,060
With automobiles, second trip	1,462
With other private transportation, as wagon, horse, and afoot	4,179
Grand total	15,001

Travel by different entrances.

Giant Forest Road	6,540
Elk Park Road	5,080
Mineral King Road	1,702
Trails, all sources	1,679
Total	15,001

Private automobile travel.

	Automobiles.	People
Entering via Giant Forest Road	771	5,396
Entering via Elk Park Road	640	4,040
Entering via Mineral King Road	216	1,086
Total	1,627	10,522

A fee of $2.50 was charged for tickets of passage on the Giant Forest road, which were good for the entire season, but no fee was exacted for passage on the Mineral King county road or the Elk Park road, which was constructed by the Mount Whitney Power & Electric Co. Complimentary tickets were issued to officials of adjoining States or counties and to officials of the Federal Government visiting the park officially.

General Grant National Park.

The aggregate number of persons making trips to General Grant National Park during the season of 1918 was as follows:

Kings River Stage & Transportation Co	956
Making park trips with private transportation:	
With automobiles, paid and complimentary	10,840
With automobiles, second trip	2,262
With other transportation, as wagon, horse, and afoot	1,438
Grand total	15,496

Travel by different entrances.

Stephens Grade Road	11,901
Millwood Road	1,812
Lake Road	1,160
Trails, all sources	623
Total	15,496

Private automobile travel.

	Automobiles.	People.
Entering via Stephens Grade road	2,128	11,260
Entering via Millwood road	216	1,296
Entering via Lake road	94	546
Total	2,438	13,102

A fee of 50 cents was charged for tickets of passage, which were good for the entire season. Complimentary tickets were issued to officials of adjoining States or counties, and to officials of the Federal Government, visiting the park officially.

CAMPS AND CAMP SITES.

The parks were well equipped this season for the joy and pleasure of mountain living. Hotel concessioners had renovated their buildings and equipment and thoroughly policed their camps prior to the date fixed for opening the parks, and many beautiful and commodious camp sites were prepared in advance for occupancy by those persons whose privilege it was to camp of their own accord, in which instances camp grounds, wood, and water were furnished free of cost. One camp sufficiently large to accommodate all of the park visitors was maintained in General Grant Park, but in Sequoia Park seven camps were established in locations as follows: Giant Forest, Wolverton, Marble Fork River, Twin Lakes, Hospital Rock, Hockett Meadow, and Quinn. All of these camps received a liberal patronage throughout the season.

CONCESSIONS.

Sequoia National Park.—Mrs. Walter E. Kenney operates a hotel with tent sleeping accommodations in Giant Forest under concession from the department, at which place 7,706 meals and 2,019 lodgings were furnished.

The Sequoia National Park Transportation Co. was granted permission to conduct an automobile stage transportation service between Lemon Cove railroad station and Giant Forest in the park.

Mr. Chester Wright conducted the pack and saddle transportation service in the park. Mr. Wright was also granted the store privilege in Giant Forest.

Messrs. Lindley Eddy and George F. Belden were granted concessions in Giant Forest for conducting photograph galleries and the sale of photographic supplies.

General Grant National Park.—The General Grant National Park Hotel Co. was granted permission to conduct a tent camp with hotel accommodations and store in the park. They report that 2,226 meals and 741 lodgings were furnished at their camp during the season.

The service rendered by all concessioners in the parks was excellent, taking into consideration the scarcity and high cost of labor and the remoteness of the parks from valley towns from whence men and supplies could be procured.

IMPROVEMENTS

Improvement work accomplished in the Sequoia and General Grant National Parks during the fiscal year 1918 was as follows:

Sequoia National Park.—A new road 9,112 feet in length, with minimum width of 16 feet and maximum width of 20 feet, including one bridge of 80-foot span and 16-foot width, has been constructed between Wolverton and the Marble Fork River. This road forms a portion of the Sequoia-General Grant Park highway extension which when completed will furnish a route for travel through both parks and over the more scenic portions of the high Sierras, through magnificent forests, beautiful mountain meadows, and along streams where there are ideal sites for camping and fishing.

New by-roads to the extent of 4,224 feet in length, with minimum width of 12 feet and maximum width of 20 feet, have been constructed around and through the Marble Fork camp grounds as the means of making accessible to automobile travel the various camp sites along the river.

A wooden stairway 346 feet in length and 4 feet in width, supported with iron posts and hand railing has been constructed to the top of Moro Rock for the benefit of those persons who wish to climb to the top of the rock for the purpose of viewing the magnificent panoramic mountain scenery.

Five tourist horse pastures have been fenced, all with American Field woven wire and natural barriers, as follows: One pasture at Sand Meadow, 45 acres; one at Clover Creek, 95 acres; one at Halstead Meadow, 25 acres; one at Cabin Meadow, 49 acres; one at Willow Meadow, 62 acres; one at Mehrten Meadow, 20 acres. These pastures, in addition to those heretofore fenced at Clough Cave, Hockett Meadow, and Quinn, on account of their favorable locations should be quite sufficient to produce forage for the stock of park visitors for several years to come.

Three new buildings have been constructed in Giant Forest camp as follows: One stable-garage 28 feet by 40 feet, including three apartments—a stable, garage, harness and grain room; one ranger-clerk sleeping quarters, 18 feet by 24 feet, three rooms; one storehouse 28 feet by 34 feet, three rooms. All of these buildings are one-story puncheon frame redwood structures of bungalow design.

Mr. Chester Wright, who holds a concession, erected a very neat two-room store building in Giant Forest for use in connection with his enterprise.

A new four-room one-story building has been constructed at Alder Creek on the Elk Park road, to be occupied by the ranger who is stationed at the place.

Three storage vaults, containers for explosives, have been constructed at convenient intervals along the Giant Forest road. These buildings are all stone and concrete structures, and range in size from 7 to 9 feet, approximately.

One hundred and eighty-eight road and trail signs, manufactured from clear redwood, painted, all bearing appropriate legends, were placed along roads and trails for the information and guidance of the traveling public.

A traverse line survey 8 miles in length has been completed on the Sequoia-General Grant Park road extension, with the view of obtaining the more feasible route for location of the road and obtaining an estimate of the cost thereof.

Approximately 100 acres of heavy sequoia timber forest land in Giant Forest have been cleared of inflammable matter, such as down and dead timber, stumps, brush, etc., as the means of lessening the danger to the forest by fire.

Roads have been improved and repaired as follows:

Giant Forest road from west boundary to Giant Forest, 20 miles, surfaced and six passageways for vehicles constructed by blasting out mountain sides, thus widening the road from 10 to 20 feet, with approximate length of 340 feet.

Moro Rock road from Giant Forest to Moro Rock, 2 miles, surfaced and fallen logs cleared from right of way.

Sequoia-General Grant Park road from Giant Forest to near Marble Fork River, 6 miles, fallen timber cleared from right of way and surfaced.

Camp Circuit road around outer border Giant Forest Camp, 1 mile, surfaced and chuck holes filled in.

Trails have been repaired and improved as follows:

South Fork trail and intersecting trails, from west to east park boundary, 64 miles, logs and landslides removed and new retaining walls constructed, overhanging brush cut, and washouts filled in.

Hospital Trail, from Hospital Rock to Giant Forest road, 6 miles, widened and washouts filled in.

Colony Mill trail, between Giant Forest road and Middle Fork Kaweah River, 8 miles, graded and brush cleared from right of way.

Main River trail, between Moro Creek and Buck Canyon, 9 miles, surfaced and brush cleared from right of way.

Cold Spring trail, between Cold Spring and Clough Cave, 13 miles, widened, graded, and brush cleared from right of way.

Seven Mile Hill trail, between east boundary and Seven Mile Hill, 8 miles, logs cleared and new retaining walls built.

Telephone lines have been repaired and improved as follows:

South Fork telephone line, from Three Rivers to Quinn, 32 miles, 4 miles new aerial line built, 6 miles new wire and brackets applied, 22 miles repaired.

Atwell Mill telephone line, from Three Rivers to east boundary, 28 miles, repaired and objectionable brush cleared away.

Giant Forest telephone line, from Three Rivers to Giant Forest, 32 miles, repaired and brush cleared from right of way.

Buildings have been repaired as follows:

Colony Mill ranger's cabin at Colony Mill, new flooring, ceiling, and underpinning applied.

Giant Forest post-office building, shelving, underpinning, and siding applied.

General Grant National Park.—Installed 5,000 feet additional water-pipe system in tourist camp ground, including 36 drinking hydrants, 5 shower-bath houses, and their equipment.

Constructed one cement-concrete storage vault for explosives, size 6 by 5 by 6 feet.

Cleared 25 acres sequoia grove of logs, brush, débris, and litter.

Road repair and improvements were as follows:

Millwood road, from west entrance to headquarters camp, 8½ miles, surfaced, logs and rocks removed, culverts repaired.

Stephens Grade-North Park road, from south to north boundaries, 5 miles, widened from 12 to 14 feet and graded.

INSECT CONTROL.

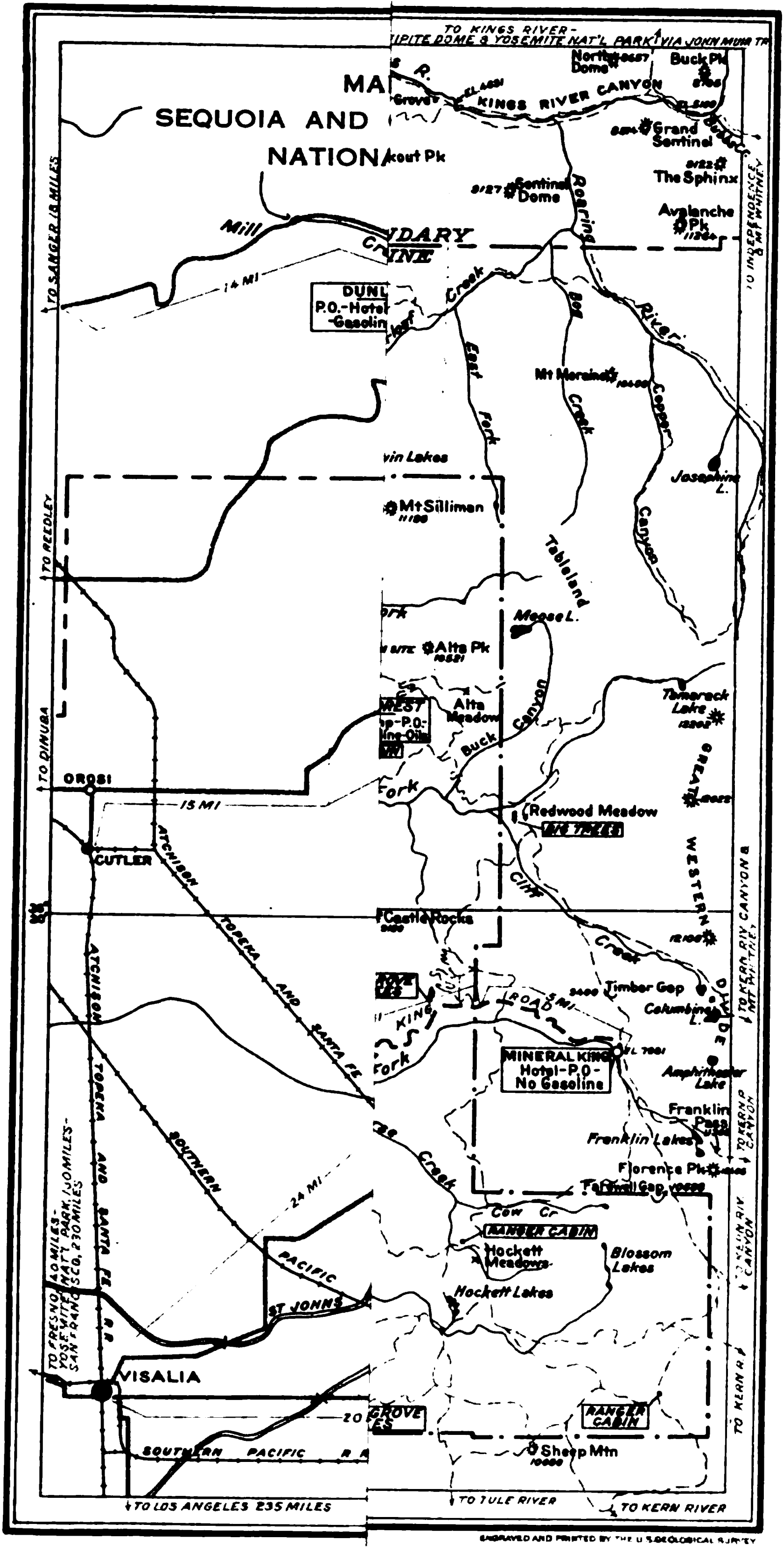
A limited entomological survey of the Sequoia National Park which was made during the summer of 1917 developed the fact that considerable damage was resulting from insect attacks in the pine timber, most noticeable near the lower timber belt in the Middle Fork of the Kaweah River and the Marble Fork Basin. It was found that the western pine beetle (*Dendroctnus brevicomis*) were killing the mature yellow pine, and serious loss was threatened as result from attacks by the mountain-pine bettle (*Dendroctnus monticolæ*) in many of the large sugar pine. About 2 per cent of the stand was found to be affected.

In order to destroy the infestation prior to its further spreading, a cooperative working plan was agreed upon during the spring of 1918 between the officials of the National Park Service and the Bureau of Entomology and Forest Service of the Department of Agriculture whereby it was decided to cut and burn the trees that were infested, thus destroying the larvæ of the young beetles while in the wood.

The control work was under supervision of Mr. John M. Miller, assistant forest entomologist.

The following is a report covering the insect-control work accomplished in Sequoia National Park during the season of 1918:

The control work accomplished during the spring of 1918 covered approximately the period from April 1 to June 10. The work was started in the Middle Fork of the Kaweah River (unit 10) as a cooperative project with the Forest Service, which controls about 25 per cent of the timber in this basin. This project was completed so far as seemed feasible with an expenditure of $896.52 within lands belonging to the Sequoia National Park. The remainder of $1,500 allotted for insect control was expended on the Marble Fork Basin of Kaweah River (unit 11). Mr. Albert Wagner, of the Bureau of Entomology, had supervision of the field work on this latter project. The following are the expenditures and the trees cut on each project:



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Unit 10.

	Number of trees	Volume b. m.
Yellow pine	52	128,128
Sugar pine	23	93,012
Total	75	221,140

Cost:	
Labor	$623.87
Transportation	227.00
Equipment	45.65
Total	896.52

Unit 11

	Number of trees	Volume b. m
Yellow pine	12	29,568
Sugar pine	45	181,980
Total	57	211,548

Cost:	
Labor	$484.50
Transportation	116.00
Total	600.00

Total, both units

Number of trees treated	134
Total volume treated (approximately)	432,688
Total cost	$1,497.02
Average cost per tree	$11.19
Average cost per thousand, board measure	$3.46

CAVE DISCOVERY.

A wonderful cave was discovered in Sequoia National Park on April 28, 1918, that surpasses in beauty and attractiveness the famous Clough Cave and Paradise Cave, both of which are also situated within the Sequoia National Park. The discovery was made by Messrs. A. L. Medley and C. M. Webster, residents of the community, while working their way up a rugged canyon in quest of trout. The cave is situated in Sec. 28, T. 15 S., R. 29 E., M. D. B. & M., on the south side of a large mountain of white limestone formation along the water's edge of Cactus Creek, in a locality heretofore unfrequented by man owing to the rough and precipitous nature of the country.

Over 4,000 feet of the cave has been explored, and by performing a small amount of development work in manner of widening out some of the more narrow passage ways so as to admit further entrance much more can be made accessible, as it is evident that the entire mountain is a mountain of caverns.

Throughout the entire cave the stalactitic formations are rich and wonderfully varied. In some chambers the ceiling is a mass of stalactites, in others from the roofs are suspended great folds of massive draperies, while in others are great fluted columns of supports and stalagmites of surpassing symmetry and beauty

Owing to the beautiful and peculiar lining of the cave the name "Crystal Cave" has been given to it.

GRAZING.

In view of the seriousness of the shortage of forage for stock in California, occasioned by drought, the like of which has not occurred within the past 30 years, and the probable loss that the stockmen would sustain by reason of such, it was decided by the National Park Service to open to grazing practically all areas within the Sequoia National Park in isolated regions not frequented by visitors, and where no injury to the natural features of the park would result from usage, excepting therefrom areas in certain localities as food supply for certain classes of game, and Government horses.

The grazing proposition was a task difficult to adjust as hundreds of applications calling for thousands of head of stock in excess of the carrying capacity of the range were received, but after several meetings and conference between members of the California Cattlemen's Association and the administration, a satisfactory decision was reached whereby 2,132 head of cattle and horses were permitted to graze in the park during the 1918 season, as against 1,305 for the 1917 season.

I am of the opinion that all of the grazing areas of the park are stocked to their full carrying capacity for the present season, and that the number of stock may necessarily have to be somewhat reduced from its present status in years to follow.

FIRES.

Six forest fires were set by lightning during the 1918 season in various localities throughout Sequoia National Park, but all were discovered and extinguished before damage of consequence was done.

FISH.

On account of the unusual low waters in all of the park streams, fishing as a general rule was better than that of previous years, but many of the streams in the vicinity of the tourist camps and along the main roadways were fished out early in the season.

Practically all the waters of the Sequoia Park are stocked with trout, but the amount of fishing requires that they be stocked from time to time, which can only be accomplished in a meager way without the assistance of a fish hatchery, which, by all means, should be established in the very near future.

Three hundred and eighty-five thousand trout fry of the rainbow, steelhead, and black-spotted varieties were obtained this year through the cooperation of the State board of Fish Commissioners of California and distributed in the park waters as follows:

In Middle Fork Kaweah River, 225,000 rainbow; in East Fork Kaweah River, 30,000 rainbow; in Wolverton Creek, 55,000 steelhead; in headwaters Marble Fork River, 12,500 steelhead; in headwaters Silliman Creek, 12,500 steelheads; in headwaters Horse Creek, 2,500 black spotted; in headwaters Sugar-loaf Creek, 5,000 black spotted; in Marble Fork River, 40,000 rainbow; in headwaters Buck Canyon Creek, 2,500 rainbow.

GAME AND WILD ANIMALS.

Predatory wild animals as well as food-bearing animals inhabit the parks at all times, but the former being of a more or less migratory nature fluctuate in their numbers throughout the parks during certain periods, and as this consequence more lions and wolves came into the Sequoia Park last winter than at any time previous in recent years. As soon as their increasing presence was discovered a campaign for their destruction was organized during the month of February in which 2 large lions, 5 coyotes, 3 lynx, and 6 foxes were killed. These species of animals being of a very wary nature when finding they were being pursued soon left the park for other regions before damage of consequence was done.

Elk.—But few elk have been seen during the season. One herd of 16 was counted in Washburn Cove on March 14, 1918, and a few head have been reported from other neighboring localities.

Deer.—Deer are quite plentiful and seem to be about holding their own.

Mountain sheep.—No mountain sheep have been seen in the Sequoia Park since the year 1910, but their fresh signs are visible on the northern spur of Mount Silliman, which furnishes conclusive evidence that they still inhabit the region.

Bear.—Both black and brown bear are very abundant in the parks and seem to be on the increase.

Wild turkeys.—The only place that wild turkeys have been seen during the season is at the junction of the Marble Fork and Middle Fork of the Kaweah River.

Quail.—Both mountain and valley quail are very abundant in the parks.

Birds.—Song birds were unusually plentiful throughout the year and many persons visited the parks for the sole purpose of studying and ascertaining the habits of certain species.

FORESTS.

There is unusual heavy crop of seed on all the coniferæ forests in the parks this season, thus a bountiful crop of seedlings of all species of the coniferæ family may be expected next year.

RODENTS.

An act for the extermination of rodents in California and having for its main purpose ground-squirrel eradication, was passed by the State legislature on March 18, 1909, and has remained in effect since that time. There has been more or less laxity in the enforcement of the law since 1912. In a session of the State legislature in 1918 a more stringent compulsory measure for the enforcement of the law was passed.

In order to comply with the provisions of the above statute, a quantity of poisoned grain was secured, by donation, from the field-rodent control of the State of California Biological Survey, and work of putting out the poisoned grain was started on August 15, 1918, and has been continued ever since. This work is being conducted by the park rangers and performed in conjunction with their other routine work in the parks.

NEW APPOINTMENT.

Mr. Guy Hopping, of Three Rivers, Cal., was appointed a first-class park ranger in Sequoia National Park, effective January 12, 1918, to fill the vacancy caused by the resignation of Mr. Ansel F. Hall, who enlisted in the United States Army.

RECOMMENDATIONS.

The following recommendations are made:

1. That Congress be requested to provide measures whereby title to the patented lands within the Sequoia and General Grant National Parks may be acquired by the United States Government for park purposes.
2. That the State of California be requested to cede to the United States Government entire jurisdiction over the Sequoia and General Grant National Parks.
3. That pending legislation providing for the extension of the boundaries of Sequoia National Park to include the Kings and Kern River Canyons and the crest of Sierra Nevada Range receive the early consideration of Congress.

MOUNT RAINIER NATIONAL PARK.

D. L. Reaburn, Superintendent, Ashford, Wash.

GENERAL STATEMENT.

Mount Rainier National Park was created by act of Congress approved March 2, 1899, and exclusive jurisdiction of the territory so set aside was ceded to the United States by act of legislature of the State of Washington approved March 16, 1901. Exclusive jurisdiction of the reservation was accepted by act of Congress approved June 30, 1916.

The park is located in the western part of the State of Washington, immediately west of the summit of the Cascade Mountains and about 40 miles southeasterly from the southern end of Puget Sound. It is situated largely in Pierce County, but a portion lies in Lewis County. The main entrance to the park is located near the southwest corner, distant by automobile road 96 miles from Seattle, 56 miles from Tacoma, and 6½ miles from Ashford, on the Tacoma Eastern Railroad, a branch of the Chicago, Milwaukee & St. Paul Railway.

Longmire Springs, distant 6½ miles by automobile road from the main entrance, is the headquarters within the park of the park superintendent and the Rainier National Park Co. Longmire Springs is connected by telephone to Seattle, Tacoma, and the principal camps and ranger stations within the park.

Mount Rainier National Park is in charge of a superintendent, who is assisted throughout the year by a clerk-stenographer and three permanent park rangers. During the summer season of this year the local force was increased by eight temporary park rangers and a small construction and repair force.

TOPOGRAPHY.

The northwest corner of the park, by road and trail travel, is about 45 miles southeast from the tidewaters of Puget Sound, an arm of the Pacific Ocean, from which waters and the country surrounding the main object of interest in the park, Mount Rainier appears during the prevalence of ordinary weather as a most imposing spectacle—an ice and snow clad dome 14,408 feet high.

The park reserve is a nearly perfect square, the sides of which are 18 miles in length, and contains, therefore, 324 square miles, or sections of 640 acres each (total, 207,360 acres), and is completely surrounded by the lands embraced within the Rainier National Forest.

Near the center of the park is the summit of Mount Rainier, from which radiates a system of glaciers ranking in importance with any similar system or group of glaciers in the world. There are more than a score of these glaciers, from which originate four important rivers, the Nisqually, the Puyallup, the White, and the Cowlitz, the three first named having large electric power generating plants located on them at points outside the park, but all dependent upon this glacial system and the waters originating therein. The Cowlitz is as important as the others in this respect, but as yet complete development of power-generating plants has not been accomplished.

The general elevation of the glacial valleys, at the boundary line of the park, is 2,000 feet above sea level. From the boundary lines these valleys afford a comparatively easy grade to the lower ends or "snouts" of the various glaciers, approximately an average additional elevation of 2,000 feet. At these glacial snouts the real Alpine nature of Mount Rainier National Park territory is thrust upon the traveler, and from over, around, and alongside the glaciers trails have been constructed with a view to making the wonders of nature within the park easily accessible as well as to provide patrol routes for the protection of the forests and game. These trails lead to the camps or parks known as Paradise Valley, Indian Henrys Hunting Grounds, Van Trump Park, Cowlitz Park, Ohanapecosh Valley, and Silver Spray Falls, Moraine Park, Grant Park, Mystic Lake, Spray Park, Natural Bridge, Cataract Basin, St. Andrews Park, Glacier Basin, etc.

The main automobile road to this vast wonderland leads out from Tacoma and Seattle and is a highly improved thoroughfare for a greater part of the distance from these cities to the park entrance near the southwest corner of the park, a distance of 56 miles from Tacoma and 96 miles from Seattle. At the park gateway this road joins the road built and maintained by the Government within the park. The Government end of this road is 20.4 miles in length, leading from the entrance gate (elevation 2,003 feet) to Longmire Springs (6.6 miles; elevation 2,750 feet); thence to foot of Nisqually Glacier (5.3 miles; elevation 3,909 feet); thence to Narada Falls (4.1 miles; elevation 4,572 feet); thence to the Camp of the Clouds, in Paradise Valley (4.4 miles; elevation 5,557 feet). To this point the road is open to automobiles during the summer months. The road above Nisqually Glacier was opened to automobiles for the first time on June 20, 1915.

FOREST CONDITIONS.

More than 200 square miles of the park lands are densely timbered. Douglas fir, white cedar, Alaska cedar, and hemlock are the predominating varieties. In addition to those named, the following varieties are found at various points within the park: Lovely fir, Noble fir, Alpine fir, silver fir, Alpine Hemlock, spruce, white pine, black (or lodgepole) pine, alder, cottonwood, quaking aspen, broad-leaf maple, vine maple, and smooth-leaf maple.

At an approximate general elevation of 4,500 feet the density of timber growth gradually diminishes until the extreme timber line is reached. The intervening areas, which are usually benches or plateaus on the long, sloping ridges, dividing the various glacial basins, form beautiful natural parks, in some of which tent camps or hotels are established, and to which tourists resort in large numbers for rest and recreation. These natural parks and tent camps serve as bases for the arduous task of ascending to the summit of Mount Rainier and for exploring the lesser mountain peaks, the glaciers, snow fields, and canyons so numerous within the national-park area.

These upland meadows, benches, plateaus, or natural parks are beautifully adorned by nature with flowers and shrubs of infinite variety and color, and furnish to the most skilled botanist, not to speak of the amateur and the mere lover of the beautiful, problems in nature study never ending. Nearly 400 varieties of plant life are known to grow within the park.

FLOWERS.

There was comparatively little snow in the park last winter. The spring came early and the summer was long. The localities which had been buried in snow and ice since the winters of 1915 and 1916 and 1917 were thawed out. The ground showed little signs of vegetable life at first, but soon the warm rays of the sun caused numerous signs of plant life, and before fall the almost black ground was covered with brilliant flowers and grasses, as though the snows of two winters had not weighed down upon it. The Alpine meadows around the base of the mountain were exceptionally beautiful this summer. This gorgeous array of flowers lasted longer than usual on account of the cloudy and rainy weather of August. About the last of August the weather changed to a period of bright, clear weather. The large flower fields changed as if by magic from the stage of blossoms to that of seeds. The seeds this fall are more abundant and better matured than they have been for several years. This also applies to the coniferous trees, which are all loaded with large, fully developed cones.

ROADS.

Nisqually road.—This road is the main thoroughfare into the park. It leads from the southwest, or Nisqually entrance, to Paradise Valley, a distance of 20.4 miles. It was originally constructed by the War Department under an appropriation of $240,000, and was opened for travel in 1910.

Horse stages were operated over the 8-mile section above Nisqually Glacier until the close of the 1914 season. This section was opened to automobiles on June 20, 1915, and has since been operated on a one-way schedule, by which cars leave Nisqually Glacier and Paradise Valley on each hour from 8 a. m. to 7 p. m., passing at Narada Falls on the half hour. During the tourist season the traffic is controlled by three park rangers stationed at Nisqually Glacier, Narada Falls, and Paradise Valley. The system, which has proved very satisfactory during the past four seasons, is operated in the following manner:

As soon as the road is clear—which under normal conditions occurs 5 or 10 minutes before the hour—the rangers at Nisqually Glacier and Paradise Valley pass the waiting automobiles through the gate, which is held open until about five minutes after the hour, they then close the gate and report by telephone to the ranger at Narada Falls, giving the number of cars in the train and the license number and make of the last car. As the cars arrive at Narada Falls from each direction they are held in the passing space by the ranger until the last cars have arrived, and then allowed to pass.

The ranger then reports by telephone to the other rangers and gives the number of the last car in each train.

When weather and road conditions are favorable, trains of 100 to 125 cars can be handled on the hourly schedule. In some instances as many as 175 cars have been passed through in a train, requiring considerably more than one hour's time to clear the road.

During the past four seasons about 25,000 cars and 125,000 people have passed over this section of road without injury to a single passenger.

White River road.—This road was constructed during the 1914, 1915, and 1916 seasons by the Mount Rainier Mining Co., under a permit from the Service, in connection with their mining operations in Glacier Basin. It follows up the north bank of the White River from the ranger station at boundary post No. 62 to Glacier Basin, a distance of 10 miles.

It follows the water grade of White River, which runs from 2½ per cent in the lower sections to 13½ per cent at the extreme upper end. It is a single-track wagon road, 12 feet wide, with well-constructed bridges and culverts. During the 1917 season the lower 8½ miles of the road was widened to 14 feet and 2 miles of it surfaced by the Park Service.

The road is passable for automobiles and trucks.

The McClellan Pass Highway leading out from Enumclaw is now completed and surfaced to The Dalles, 29 miles. Money was appropriated by the State legislature for improving the 10-mile section between The Dalles and the ranger station in the 1918 season, but the work was postponed on account of the war.

When the McClellan Pass Highway is completed to the ranger station, large numbers of people will visit this section of the park.

TRAILS.

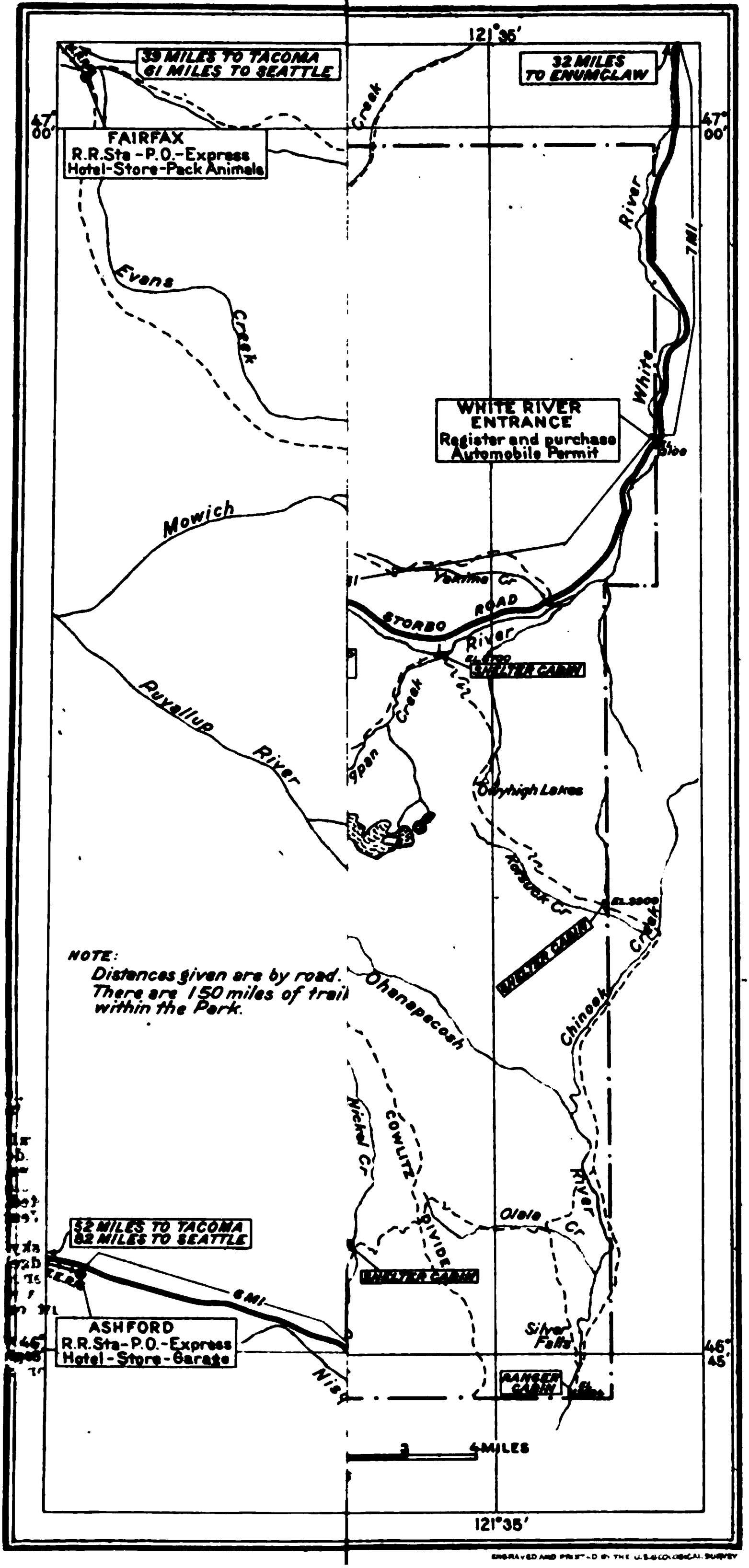
The park trail system which entirely encircles the mountain, with the exception of th 12-mile section between Carbon Glacier and Glacier Basin, has been improved and is first-class condition for tourist travel.

During the fiscal year ending June 30, 1918, about $15,000 was expended on tr improvement. This work consisted of relocating and constructing on a maximum gra of 15 per cent all steep pitches, blasting out stumps and rocks, construction of bridg and grading. A total of 114 miles of trails were improved. The new cut-off trail fr Forks of the Mowich via Crater Lake and Ipsut Pass to the Carbon River was comple This new trail effects a saving in distance of about 15 miles in the length of the W Side trail, between the southwest entrance and the Carbon River Ranger station.

Another new trail constructed during the past fiscal year is that known as the " line trail." This leads from Paradise Inn in Paradise Valley up timber-line ri crosses above Sluiskin Falls, and follows down Mazama Ridge to Reflection Lakes, th via Narada Falls and up the ridge to Paradise Inn. It is about 8 miles in length and has been used by large numbers of tourists. The time required to make the circ horseback is about four hours.

Another new trail to be known as the "Tatoosh trail" has been projected, and is go under construction. It starts from Narada Falls and runs south on the level, throu heavy timber for about 1 mile to Tatoosh Creek, at elevation 4,400, then ascends o maximum 15 per cent grade, via Tatoosh Park, to a saddle in the summit of the Tatoosh Range, which has an elevation of 5,500 and looks directly down the West Fork of Butter Creek.

It then follows eastward along the Tatoosh summit for a distance of 3 miles to Unicorn Glacier, from where it descends on a maximum 15 per cent grade and joins the Ohana-



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pocosh trail at Reflection Lakes. The distance from Narada Falls and return over this trail will be about 10 miles and will require about five hours' time to make the circuit on horseback.

The combined sky line and Tatoosh circuits can be made in one day of about eight hours' actual traveling time.

ROAD IMPROVEMENT.

The following amounts have been expended on maintenance and improvement of the Nisqually Road from the southwest entrance to Paradise Valley, 20 miles:

July 1, 1914, to June 30, 1915	$32,364.19
July 1, 1915, to June 30, 1916	17,865.94
July 1, 1916, to June 30, 1917	25,560.58
July 1, 1917, to June 30, 1918	32,421.05
July 1, 1918, to date (approximate)	2,500.00
Total	110,751.76

This work has included general repair and improvement, consisting of widening from 12 to 16 and 18 feet. Construction of new culverts and bridges, rock and timber crib retaining walls, timber guard rails, rock guard walls, and surfacing with 6 inches of cement gravel. During the past fiscal year the following work has been done:

New 60-foot span cedar-log bridge constructed over Tahoma Creek, at mile 1.2, to replace the concrete bridge destroyed by floods on December 18, 1917.

One thousand cubic yards of rock blasted from Blow Horn Point, mile 2.6, and the approaches thereto widened, new 40-foot cedar-log bridge constructed over Kautz Creek, at mile 3.4, to replace the old log bridge destroyed by the December, 1917, floods.

Construction of a new 35-foot cedar-log bridge, at mile 3.7, and 700 feet of new road to eliminate a sharp curve immediately west of the bridge.

Extensive widening and cribbing work at mile 7.8 and at the switchbacks between Van Trump camp and Christine Falls. Blasting of the solid rock, widening to 18 feet, and construction of a substantial rock parapet wall, 2 by 2 feet, between the Glacier Road camp and Nisqually checking station. At Narada Falls the Narada parking space has been increased 50 per cent by widening and the entire 8 miles of road above Nisqually checking station has been made safe by the construction of rocks and log parapet walls.

At all points below the Glacier the road has been widened to a minimum width of 16 feet and a maximum width of 18 feet.

The entire 20 miles of road has now been surfaced with 6 inches of cement gravel, and is in first-class condition for automobile traffic.

The following amounts have been expended on the construction and improvement of the White River road:

By Mount Rainier Mining Co	$38,500.00
By National Park Service, since July 1, 1917	12,990.76
Total	52,490.76

The work accomplished on this road under the $12,990.76 expended by the Service was as follows:

New side-hill construction	feet	2,100
Graded and widened to 16 feet	miles	3.6
Surfaced 6 to 12 inches deep	do	2.0

About $1,250 of the above amount was expended in June, 1918, in repairing the damage done by the floods of December, 1917.

RIVER-PROTECTION WORK.

As a result of the heavy floods of December, 1917, the Nisqually River threatened to break over and flow through an old channel which leads by the park entrance, in which event the buildings at that place would have been seriously damaged.

To remedy the situation and to prevent future floods from following down the old channel a log crib wing dam 5 feet high and 350 feet long was constructed on the north side of the river channel to divert the water away from the head of the old overflow channel.

This work was done in May, 1918, at a cost of $550.

ELECTRIC-LIGHT PLANT AT PARK ENTRANCE.

In October, 1917, at a cost of $565, a Delco electric-light plant was installed at the park entrance for supplying light to the office superintendent's residence and ranger cottage, which has given very satisfactory service.

The engine charges the batteries at the rate of 750 watts and will support thirty 25-watt lights for 5½ hours on 1 gallon of kerosene.

The manufacturers claim that its efficiency is five times that of oil lamps.

BUILDING CONSTRUCTION.

The following new buildings were constructed during the fiscal year ending June 30, 1918:

Ranger cottage at park entrance, 1½-story frame, shingled roof and sides, 20 by 28 feet, with 14 by 16 foot woodshed; cost, including bath, toilet, and cookstove, $900; 10 by 24 foot shed addition to auto barn at park entrance, cost about $100; 12 by 16 foot woodshed with shingled roof and sides in rear of the office building at Longmire Springs, cost about $150; 16 by 30 foot mess house, with shingled roof and beveled siding, at Longmire Springs, cost about $450; two bunk houses, 14 by 20 feet, with shingled roof and beveled siding, at Longmire Springs, cost each $235; three checking stations at Nisqually Glacier Station, Narada Falls and Paradise Valley, 1½ stories, 14 by 28 feet, with shingled roof, beveled siding, and interior lining of headed ceiling, cost each, including cookstove and heating stoves, $580; office building at White River entrance, 1½ stories, 14 by 28 feet, with shingled roof, beveled siding, and interior lining of headed ceiling, cost complete, including stoves, $559.17; White River entrance gate, built of large cedar logs on same plan as the one at southwest entrance, span 14 feet, width 21 feet, length 24 feet, cost $500.

IMPROVEMENT OF CAMP GROUNDS AND SANITATION.

During the fiscal year ending June 30, 1918, a total of $7,500 was expended on improvements of camp grounds and sanitation. The following work was accomplished under this expenditure:

At park entrance.—A general clean-up of the grounds, including the removal of a large number of dangerous trees, leveling, planting lawns, the construction of a cesspool, three comfort stations, and the installation of seven sanitary toilets.

At Hanson's camp, mile 0.9.—Removed logs and cleaned up grounds.

At Longmire Springs.—Installed sewer system, consisting of over 2,000 feet of 8-inch and 6-inch and 4-inch sewer pipe; water system, consisting of 1,000 feet of 2-inch wood pipe and laterals of three-quarter inch iron pipe; constructed 9 comfort stations and installed 12 sanitary toilets; removed all cottonwood and other dangerous trees from the Longmire public camp grounds; removed bowlders, built roads through the grounds, leveled the ground, and made a general clean-up of the entire premises; built 950 feet of rock wall 3 feet wide and 3 feet high.

At Van Trump Camp.—Removed dangerous trees, logs, bowlders, and made a general clean-up.

At Paradise Valley.—Constructed a 12 by 16 foot public-comfort station in the rear of the checking station and installed therein eight sanitary toilets.

During the 1918 season the following has been constructed from the 1919 appropriation: At Glacier, Narada Falls, and Paradise public camp grounds three 8 by 10 public-comfort buildings of four sanitary toilets each.

The Paradise public camp grounds have also been improved by the construction of a road about 1,200 feet in length leading into them from the public parking place, and the installation of a water supply.

Materials have been ordered, and before the close of the 1918 season 1,100 feet of 6-inch sewer pipe will be installed, leading from the Rainier National Park Co.'s septic tank to Paradise River. This pipe will be the main outlet for sewage from Paradise Inn and surrounding grounds.

TELEPHONES.

The park telephone system consists of the following lines:

Commercial line.—The Government double-wire metallic line formerly operated by the Tacoma Eastern Railroad Co. From Ashford, Wash., to Longmire Springs, 13 miles.

Government single-wire line.—From Nisqually entrance to Paradise Valley, via Longmire Springs, Glacier checking station, and Narada Falls, 13 miles.

From Nisqually entrance to Carbon River ranger station, via West Side Trail, 40 miles.

From Fairfax to White River ranger station, via Carbon River, Mystic Lake, Winthrop Glacier, Glacier Basin, and White River road, 39 miles

From Narada Falls to Ohanapecosh ranger station, via Ohanapecosh trail, 15 miles.

From Ohanapecosh ranger station to White River road, via East Side Trail, 17 miles.

During the 1918 season an additional line was constructed from Longmire Springs to Paradise Inn, 6 miles.

Total mileage of telephone wires, 130 miles.

The park telephone system connects at Longmire Springs and Ohanapecosh ranger station with the Forestry Service lines in the territory south of the park.

A telephone line has been constructed along the McClellan Pass Highway from Enumclaw to a point above Greenwater River, 28 miles. The Mount Rainier Mining Co. has constructed a line from the White River ranger station down to Silver Creek. This leaves about 11½ miles of line yet to be built between Enumclaw and the White River ranger station.

A switchboard has been purchased and will be installed at Longmire Springs.

MEDICAL SERVICE.

During the 1917 season Dr. J. R. Turner, of Tacoma, Wash., was employed on a salary basis, and was located at Longmire Springs, where he rendered all necessary medical assistance to men employed on improvement work and to others in the park.

During the 1918 season medical and hospital service to park employees was rendered by Drs. Long and Bridge, of Ashford, Wash., and Eatonville, Wash., on the basis of a pay-roll deduction of $1 per month from the men's salaries.

A double-framed tent at Longmire Springs, equipped with cots and other medical equipment and supplies, was used as an office and temporary hospital by Dr. Turner.

ACCIDENTS AND DEATHS.

A number of minor accidents to men employed on the park work occurred, all of which were reported to the United States Employees' Compensation Commission. Several injury claims were paid by the commission.

Three deaths occurred in the park during the year, all of which were due to accidents. On August 12, 1917, Miss Dorothy Haskell, aged 14, of Tacoma, Wash., lost her life by falling into a crevasse on Paradise Glacier.

The accident was due entirely to the inexperience of the party of which the girl was a member. Leaving Paradise Inn in the forenoon, unequipped for glacier work, the party, composed of Miss Haskell, her father, mother, and a Mr. Palmer, of Tacoma, ascended to the 7,000-foot level and crossed over onto the glacier, with the intention of traversing it to the lower end at Sluiskin Falls. As the party was nearing the huge crevasses cutting into the ice from below, Miss Haskell, who was walking directly in front of Mr. Palmer, suddenly disappeared through the crust of snow spanning the open crevasse. The accident occurred at 11 a. m. At 3 p. m. word reached Paradise Inn and the park ranger with men and ropes hurried to the scene. The park ranger was lowered into the crevasse to a depth of more than 100 feet and finally recovered the body on a ledge about 85 feet below the surface, under several feet of snow.

On May 12, 1918, Miss Ruth Dery, of Portland, Oreg., met with an automobile accident near the park entrance which resulted in her death. She was returning from a visit to the park in a party composed of Lieut. John S. Robson, Lieut. Paul S. Hassler, Sergt. Robert Boyd, and Corpl. Anton Krasberg, of the spruce-production division, United States Army. When within 500 feet of the entrance the driver, Sergt. Boyd, lost control of the car, presumably from some mechanical defect, and it went over a 6-foot bank with the occupants underneath.

The accident occurred at 4 p. m. Miss Dery was taken to the entrance, where she was attended by Drs. Long and Bridge until her death, at 11 a. m. the next day. Corpl. Krasberg suffered a broken leg and was removed to the hospital at Eatonville.

On August 27, 1918, about 7 p. m., Harry Lyons, a young man 17 years of age, employed in the Narada road camp, while playing on the bank of Paradise River at the top of Narada Falls in company with another young man from the camp, in some way lost his footing, fell into the river, and was carried over the falls. The body was recovered at 3 p. m. August 29, and was sent to Tacoma for burial.

VIOLATIONS OF LAW.

There have been but few violations of law, only four cases having been handled by the park commissioner during the year. Two of these cases were violations of the automobile regulations, one against some Yakima Indians for hunting in the park, and one violation of section 6 of the general rules and regulations which prohibit private operations.

Fines ranging from $5 to $75 were imposed by the commissioner.

As a rule, park visitors have shown a disposition to comply with the park regulations and in many cases have made inquiry from the park officers concerning them.

FOREST FIRES.

No forest fires occurred in the park during the year. Several fire calls were responded to promptly by the ranger force, who extinguished them before any damage resulted.

There were numerous fires outside the park in the national forests, a number of which were located and reported by the Forest Service from the Anvil Rock fire lookout station.

RANGER SERVICE.

The ranger force consists of 10 rangers from June to November and 4 rangers during the remainder of the year. One ranger was located at each of the following stations: Carbon River, White River, Ohanapecosh River, Longmire Springs, Nisqually Glacier, and Narada Falls. Two rangers are on duty at both the park entrance and Paradise Valley. The rangers located at the Ohanapecosh River and Carbon River stations supervised all trail-improvement work in their districts in addition to their patrol duties.

During the 1918 season the rangers detailed to checking automobiles along the Nisqually Road handled the traffic very efficiently and with much credit to themselves.

FISH AND WILD ANIMALS.

In September, 1915, Mr. Ira D. Light, Pierce County fish and game warden, planted about 25,000 eastern brook trout in the waters of the Carbon River district, distributed in Ranger Creek, Ipsut Creek, Crater Lake, Chenuis Lakes, Chenuis River, Capley Lake, and Canada Creek, since which time fishing has been prohibited in these waters. On the recommendation of Mr. Light the time limit for fishing in these waters was extended to April 1, 1919. According to reports from the ranger, these fish are now to be seen in large numbers, particularly in Crater Lake, where they are 18 inches long.

This work was continued by Mr. Light in July, 1917, when he transplanted 25,000 eastern brook trout in the park waters, distributed as follows:

Reflection Lakes	3,500
Lake Louise	2,500
Fish Creek	7,500
Lake George	3,500
Golden Lakes	8,000
Total	25,000

Fishing in these waters has been prohibited until April 1, 1921. Fish in these waters have been seen in great numbers, and they are apparently doing well. The fish were packed to the waters on pack animals in tin cans. They were released in excellent condition, and this experience has demonstrated that fish can be carried to any waters in the park with comparatively little loss. Mr. Light expects to continue the work by stocking other streams and lakes next year.

With the exception of those parties visiting the outlying districts, practically no fishing has been done by park visitors.

As a result of stocking these waters, many of which contained practically no fish, they will in the future afford excellent angling.

None of the wild animals of the park are very abundant. The cougar is perhaps the most destructive, though there was little evidence of his presence during the past year. Timber wolves are also quite destructive. Both feed largely upon deer. Coyotes visit Paradise Valley and the alpine meadows all around the mountain during the winter season. They are more abundant on the south and east sides of the mountain, where they come in bands; but they are often found below in the heavily timbered areas of the park, though never in great numbers. In the upper region they seem to search for the ptarmigan and grouse. In the lower or wooded area the snowshoe rabbit is his principal victim.

The wildcat is more abundant than the cougar. Snowshoe rabbits and other small animals fall an easy prey to his ferocity. The Canada lynx is very similar to the wildcat. This animal is quite rare in the park.

The otter was found formerly in the park, but has not been seen for a long time. Minks, weasels, ermines, fisher, and marten are often seen. These, though chiefly small, are valuable fur-bearing animals.

The black bear is one of the common wild animals of the park. After the huckleberry crop has been harvested he often makes raids on the camps for bacon, etc. He hibernates in the upper regions of the park in ravines which become filled with snow. In the forest he selects a large hollow cedar for his winter quarters.

The brown bear has been seen many times in the vicinity of Reflection Lake.

The raccoon is a common prowler about Longmire Springs in the winter nights.

The Douglas squirrels and chipmunks furnish much amusement for park visitors.

The whistling marmots always attract attention by their piercing shrill whistles. The nicely arranged bundles of leaves, grass, etc., near their burrows are always characteristic signs of these hibernating animals.

The beavers are interesting animals, and their house and dams are visited by many tourists. On the Tahoma Creek trail, about 2 miles up from the automobile road, the beaver built a dam which formed a reservoir and flooded a bridge on the trail. The dam was destroyed early in the season by the trail crew, but it has since been reconstructed by the beaver, and it may now be necessary to relocate the trail around the reservoir.

The mountain beaver is not at all rare. The work of this nocturnal animal is common along the trails, roads, and forest.

The rock rabbit, cony or pica, lives in piles of rock and talus slopes. He puts up dried vegetation for winter use. He often utters a shrill note to attract attention.

The mountain goat is found in the higher altitudes nearly all around the mountain. They are more abundant on the east side than anywhere else. They are seldom seen by tourists. They are very shy.

Elk have been reported from the park. Their horns have been picked up in several different localities. No authentic report has been made on elk in recent years.

Wood rats and the common rat and mice follow the line of travel.

BIRDS.

On account of dense shady forest condition in the lower altitudes of the park bird life is not abundant. Yet in these shady retreats one would not have to sit long quietly on a log before the birds would begin to make their appearance. No attempt has been made by us to list the birds of the park; neither has there been anything written on the birds of the park; although other features have been exploited more or less by the newspapers, magazines, and special monographs.

No attempt is here made to make a complete list. The common birds which are here the whole year are the blue jay, gray jay or camp robber, the pine siskens, juncos, wrens, chickadees, water ouzels, Clark's crows, blue grouse, ptarmigan, and leucosticte.

Summer visitors are the western robin, varied thrush, blackbird, mountain bluebird, western golden-crowned kinglet, humming birds, flickers, swallows, pigeon, quail, and northwestern sparrows.

Crows and ravens are nearly always present. The American magpie is often present in the winter months, especially in the alpine meadows. Grosbeaks, sparrows, woodpeckers, owls, hawks, and eagles are often seen during the tourist season.

Sandhill cranes and ducks are often seen along the streams and lakes. Wild geese often in their migratory flights rest along the ponds and small lakes of the park.

FIREARMS.

With one or two exceptions in the case of persons engaged in herding cattle, no permits to carry firearms in the park have been issued.

As far as possible all firearms are taken up and held at the point of entrance until the owner leaves the park.

Persons entering the park at one point and intending to leave at another with firearms in their possession are allowed to carry them through the park under seal only.

Firearms found in the possession of persons inside the park are taken up, sealed, and held until the owner leaves.

GAME PROTECTION.

Notwithstanding a rigid enforcement of the rules which prohibit hunting inside the park, it is impossible to protect the park game, because of the fact that large numbers of deer are driven down into the lower elevations by the fall and winter snows and are killed outside the park by hunters during the open season.

A movement is now under way to create a game preserve surrounding the park for the purpose of protecting park game.

GRAZING.

During the 1917 and 1918 season, for the first time in the history of the park, permits were issued for the pasturage of small herds of cattle. This was done solely as a war emergency, and the practice will be absolutely discontinued at the close of the war or earlier if there is not urgent need for this grazing land.

Under permits issued by the Service for the 1918 season, H. J. Snively, jr., is grazing 283 head of cattle in the region north and west of the White River road, and Batson & Siler are grazing 325 head of cattle on the Ohanapecosh Divide.

MINING CLAIMS.

Mining operations are confined to claims located prior to the act of Congress of May 27 1908, prohibiting the location of mineral claims within the national park.

The Mount Rainier Mining Co. have been operating for a number of years on the development of their claims in Glacier Basin.

Under permit from the Service they have occupied certain lands not included in their location, and have constructed several buildings, a sawmill, a power and light plant, an aerial tramway, a wagon road up the north bank of White River, and have driven several hundred feet of tunnels.

The company has recently secured some additional capital, and have a mining engineer on the ground in charge of their development work.

The Eagle Peak Copper Mining Co. is working toward the development of two claims in the Nisqually Canyon near the mouth of the Paradise River. This company has driven a tunnel over 400 feet in length, and have installed a power plant, which generates about 20 horsepower.

Sherman and Ike Evans have two claims adjacent to those of the Eagle Peak Co., which have been leased to persons interested in the Eagle Peak Co.'s claims for the purpose of mining copper ore and hauling it to the railroad at Ashford.

According to assays made on a carload shipped to the smelter at Tacoma, the ore of the Mount Rainier Mining Co. runs about $60 per ton in copper. No shipments except for test purposes have been made by the Eagle Peak Co.

MINERAL SPRINGS.

The principal mineral springs, and the only ones of easy access to the tourist, are those located on the patented land at Longmire Springs. Several kinds of mineralized water spring from the ground on this tract. Some of this water has a temperature of 70° F. on reaching the surface. It is heavily charged with sulphur, and a swimming tank is provided in order that visitors may take a "sulphur plunge." Other waters are charged with iron, and still others are sweet, cool, and sparkling.

But little care has been exercised in the past to prevent pollution of these springs. During the 1916 season the property was leased to a company known as the Longmire Springs Hotel Co. This company has constructed 16 new cottages and has done considerable work toward cleaning up the springs and grounds, and a new two-story hotel building, 50 by 100 feet, has been constructed.

The Ohanapecosh hot springs, near the southeast corner of the park, are very hot and are noted for their curative qualities. Very little development work has been done on them, and they are accessible by trail only, 13 miles from Lewis, Wash., or 15 miles from Narada Falls. They are located just south of the park boundary in the national forest. The small amount of land involved should be added to the park, so that it may be properly developed by the park service and made available for use of visitors.

Fine mineralized water has been discovered along the recently constructed West Side trail on the South Fork of the Puyallup River, near boundary post No. 16.

TRAVEL.

A large part of the precipitation during the past winter, especially in the early part of the winter, was in the form of rain, and the result was that the snowfall was considerably below normal, with a corresponding early opening of the park for the 1918 season.

The dates of opening the Nisqually Road to various points for the past four seasons is shown in the following table:

To—	1915	1916	1917	1918
Longmire Springs	All winter	May 18	June 4	May 1.
Nisqually Glacier	May 15	June 15	June 28	May 12.
Narada Falls	June 10	July 14	July 12	June 9.
Paradise Valley	June 15	Aug. 24	Aug. 9	July 6.

The total number of persons who visited the park for the past four seasons is shown in the following table for various periods:

Period.	1915	1916	1917	1918
To June 30	4,751	811	1,177	4,775
Month of July	11,306	4,786	8,132	12,386
Month of August	13,782	10,574	17,864	18,286
Sept. 1 to close of season	5,327	7,818	8,395	8,454
Total	35,166	23,989	35,568	43,901

Travel for the Labor Day period broke all records, the figures being as follows:

Saturday, Aug. 31	1,300
Sunday, Sept. 1	3,700
Monday, Sept. 2	500
Total	5,500

The total registration up to October 12 was as follows:

At the main entrance	43,432
At the White River entrance	238
At the Carbon River entrance	145
At the Ohanapecosh entrance	86
Total	43,901

Distribution of visitors.

From Tacoma	11,056
From Seattle	13,738
From other points in State of Washington	12,252
From points outside State of Washington	6,855
Total	43,901

Number entering in private automobile	39,425
Number entering by Ashford stage	660
Number entering by Tacoma and Seattle stage	1,963
Number entering by cars not operated by Rainier National Park Co	1,099
Number entering by motorcycle	218
Number entering by horse-drawn vehicle	125
Number entering by foot	411
Total	43,901

It is estimated that 9,858 people came into the park for camping purposes.

During the year ended October 12, 1917, 7,602 automobile entrance permits and 144 motorcycle permits were issued.

A comparison of the above figures for the 1918 season with those of the past few seasons shows a very decided increase of travel by private automobile, and a corresponding decrease in number of visitors from points outside the State of Washington.

Travel by rail for the 1918 season was small. A large percentage of the out-of-State visitors entered in private automobile. No record was kept from which to compile a list of cars from the various States. Oregon was first on the list of out-of-State cars, with California second. Nearly all of the States were represented, including several cars from Maine, Massachusetts, New York, and Florida. Hawaii and British Columbia contributed quite a number of cars.

TRANSPORTATION SERVICE TO AND WITHIN THE PARK.

The Rainier National Park Co. operated throughout the season on a regular daily schedule, standard 7-passenger touring cars from Seattle, Tacoma, and Camp Lewis to the park. Twelve-passenger auto buses from Ashford to the park, and both 7-passenger and 12-passenger cars from point to point within the park. This company also furnished standard 7-passenger touring cars for the exclusive use of private parties to and from points within the park.

HOTEL AND CAMP ACCOMMODATIONS.

Rainier National Park Co., organized in March, 1916, to operate hotel, camp, and transportation service in the park, has completed its third season.

The following hotels and camps were operated during the 1918 season by this company:

National Park Inn at Longmire Springs.—This hotel was purchased by this company from Mr. James Hughes, under whose management it has been operated for the past seven years, and put into commission under the new management on June 1, 1918, and closed on September 16, 1918. The building is two and a half stories high, 125 feet long, and 32 feet wide. There are 36 guest rooms in the main building, and through the use of tents 250 guests may be accommodated.

There is in addition a very attractive club house as assembly room, built of pine logs, which is used for dancing and other forms of amusement. Water is taken from the Nisqually River for the operation of an electric-light plant and refrigerating plant, which also supplies electric light to all Government buildings at Longmire Springs.

Glacier Camp.—This camp is located at Nisqually checking station, 5½ miles above Longmire Springs. It consists of a very attractive log and shingle structure, which is used as a lunch pavilion. A number of bungalow tents were operated in connection with the camp for sleeping quarters. The camp is supplied with electric current from the Van Trump power plant. The function of this camp has been to furnish quick service and refreshments of all kinds to automobilists who stop for a short time at this place.

The camp was opened on June 28 and closed on July 31.

The bungalow tents which were used at the camp have been moved to Paradise Valley, and it is quite likely that no effort will be made to provide sleeping quarters at this camp next season, as the demand is amply supplied at Longmire Springs and Paradise Valley.

Paradise Inn in Paradise Valley.—This hotel was built in 1916 and opened July 1, 1917. The framework of the building is entirely of weathered logs, from the Silver Forest near by. These logs show entirely to the ridge pole in the big lounging room, which is 50 by 112 feet. The dining room is practically of the same size.

There are 44 sleeping rooms in the building and about 100 bungalow tents grouped near by. The room and bungalow tent arrangement provides sleeping quarters for 450 guests, and the dining room and kitchen equipment is capable of serving meals to 700 or more people. The service at Paradise Inn during the 1918 season has been kept up to the high standard established in the 1917 season, notwithstanding the high cost of labor and food supplies, and the fact that many times during the season it has been filled to overflowing.

Paradise Camp.—This camp is located on top of Theosopy Ridge at the site formerly occupied by John L. Reese, and the camp equipment formerly used by him is employed.

The camp consists of an à la carte lunch pavilion and a number of tents equipped with beds, springs, mattresses, and under the plan of operation patrons are allowed to do pretty much as they like. They may rent the tents furnished in part or in whole, and take their meals either at the lunch counter, or do their own cooking by an open camp fire, fuel for which is furnished by the company. Campers' supplies are sold at the camp, so that patrons may in every way be governed entirely by their own wishes in their manner of living.

Indian Henry's camp.—This camp was located on the ground formerly occupied by George B. Hall. The old Wigwam Cabin and equipment used by him were employed. The camp was opened July 1 and closed July 27 for want of sufficient patronage. The tent equipment was packed up and taken to Paradise Valley, where there was a demand for it.

The Longmire Springs Hotel is owned by the Longmire Springs Hotel Co. This hotel, constructed in 1916, is located on the patented land at Longmire Springs, and does not therefore come under the supervision of the National Park Service except so far as its police regulations are concerned. It is a two-story structure, with 17 sleeping rooms, some of which have private bath. There are 16 bungalow tents and a number of framed tents, which brings the total sleeping capacity up to about 250.

In all, the park hotels and camps furnish sleeping quarters for about 1,150 to 1,200 people.

PUBLIC CAMP GROUNDS.

For the accommodation of visitors who bring in their own tents, beds, cooking utensils, and food supplies, free public camping grounds are provided at Longmire Springs, Van Trump Camp, and Paradise Valley. These grounds have been cleaned up and supplied with water, sewers, and sanitary toilets.

INFORMATION BUREAU.

A bureau of information, in charge of Prof. J. B. Flett, park ranger, was maintained in the office of the superintendent at Longmire Springs, for the purpose of informing visitors in regard to the flowers, trees, animals, and points of interest in the park.

RECESSION OF NISQUALLY GLACIER.

It is a well-known fact that the glaciers of North America are slowly receding. Very little reliable historical data have been kept to show the real rate of recession. In 1857, Gen. A. V. Kautz, at that time a lieutenant stationed at Steilacoom, reached the terminus of the Nisqually Glacier in his attempt to reach the summit of the mountain. From his account of the trip the following sentence shows where the glacier terminated: "The walls of the immense mountain gorge were white granite, and, just where the glacier terminated, the immense vein of granite that was visible on both sides seemed to form a narrow throat to the great ravine, which is much wider both above and below." This is an exact statement, and fits a definite place in the old glacier bed. There is only one point to which the above description can apply. The distance from this narrow throat in the ravine to the present ice front of the glacier is 2,200 feet (paced). If we divide the whole distance by 61, the number of years since Gen. Kautz made his observation, we find that the glacier has receded on an average of 36 feet a year.

Within the memory of the pioneers, the glacier extended down to the location of the present bridge, which measures 1,440 feet below the ice front of the glacier. From a photograph taken by Dr. G. C. Wagner in 1892, a granite rock is identified, which was near the ice front at that time. This granite rock is now about 1,300 feet from the present ice front, a recession of 50 feet per year for a period of 26 years since 1892. The rate of recession is much greater in recent years than 50 feet. It is not far from 100 feet at the present time. It may be that the climate is becoming warmer or that there is less precipitation, or both of those causes combined.

THE FORTY-EIGHTH ANNIVERSARY OF FIRST ASCENT OF MOUNT RAINIER.

The forty-eighth anniversary of the first successful ascent of "Mount Tahoma" (Rainier) was duly celebrated in Paradise Valley, not very far distant from the original camp of the pioneers, on August 16, 1918.

This anniversary brought together from different parts of the State 'a noteworthy assembly of pioneers and those interested in mountain climbing. The selection of the camp-fire site was within sound of the rushing waters of Edith Creek, and the distant booming of the falls near-by lent an air of the true mountain spirit to the large, enthusiastic audience seated in the amphitheater on the mountain slope. In front blazed a large fire made of old stumps and logs neatly built in pyramidal style. The fire was presided over by the Rev. Wheeler, assisted by Deacon W. W. Parker. In the midst of the ceremonies the winds burst forth from their caves and blew in all directions, so that these two good firemen had all they could do to control it.

Mr. O. B. Sperlin, chief guide for the Rainier National Park Co., presided at the meeting. The conception of holding a celebration is said to have originated in the guide department. The celebration was given due publicity not only by that department but by everyone connected with the hotel, so that its success was assured from the beginning. Mr. Sperlin, in calling the meeting to order, stated its purpose and gave a brief historical outline. He also read a telegram from the Hon. Stephen T. Mather, Director of the National Park Service, sending his regrets that urgent business in the park service prevented his attending the celebration. He then introduced Gen. Stevens, who gave a detailed account of the first ascent of Tahoma by himself and P. B. Van Trump from the time they left Olympia to their triumphant entry back through the main street of that city, riding in Mr. Longmire's wagon, drawn by two prancing horses, with flags flying from each side of the dashboard, and how they were lionized by their friends. No general, he said, riding at the head of a triumphant army ever received a greater ovation.

He gave a wonderfully minute account of the trip, going into details as if the journey had been made yesterday. His story of camp life in the wilds and his associations with the Indian guide, Sluiskin, were particularly interesting.

Mr. Sperlin then introduced Mr. Bonney, secretary of the State historical society, who read in Chinook jargon Sluiskin's harangue to the climbers. The general had explained how Sluiskin had advised them not to approach nearer to the mountain, because it was the abode of evil spirits, and that if they should succeed in reaching the summit they would be surely killed, for he told them of the fate of some Indian who had made the attempt with fatal results.

Prof. Meany followed, paying a glowing tribute to Gov. Isaac Stevens, the father of Gen. Stevens. He also spoke appropriately of the life work of the general, P. B. Van Trump, and other pioneers.

At the close of Prof. Meany's address, Miss Alma D. Wagen led the audience in patriotic songs.

To commemorate the first ascent by the pioneers, Mr. O. B. Sperlin led a party up the mountain the next day, and spent the night in the crater, just as the pioneers had done 48 years before. The weather had proved to be cold and stormy, and several members returned with frozen toes and fingers.

RECOMMENDATIONS FOR ROAD CONSTRUCTION AND IMPROVEMENT.

It is a remarkable coincidence that the four largest rivers originating from the glaciers of Mount Rainier, namely the Nisqually, the Carbon, the White, and the Ohanapecosh, flow out of the reservation at its four corners. Along each of these four streams a State or county highway leading up to the park has been projected. During the past three years surveys and investigations have been conducted to determine the most feasible routes for a complete system of roads within the park. To meet the above-mentioned conditions, road development would naturally consist of the extension of these State and county highways into the park along these watercourses to the snouts of the glaciers from which they flow, and in the investigations consideration has been given to determining feasible routes for connecting these roads.

The ideal plan would be the construction of an automobile road entirely around the mountain, and this has been advocated and discussed for a number of years.

An examination of the topographic map of the park reveals the fact that on the western and northern sides there are a number of large streams, with intervening high ridges crossing the park boundary at right angles. It will require approximately 40 miles of heavy mountain-road construction to make a connection along the west side of the park between the Nisqually River and the Carbon River and about the same number of miles for a north-side connection between Carbon and White Rivers, while on the southern and eastern sides of the park the watercourses approximately parallel the park boundary, and the distances and difficulties to be overcome are not so great. I would therefore recommend that no further consideration be given at present to the west and north side road projects.

M'Clellan Pass State highway.—This road is projected from Auburn, Wash., on the Pacific highway, via Enumclaw, White River, Klickitat Creek, Cayuse Pass, Chinook Pass, at the summit of the Cascades, American River, and Natches River to North Yakima.

As mentioned elsewhere in this report, on the western side of the Cascade summit the road has been completed to The Dalles on White River, 29 miles above Enumclaw.

Funds for the completion of the 10-mile section between The Dalles and the White River ranger station were available for the 1918 season, but the work was postponed on account of the war.

For work on the east side funds were available, and it was expected to have the road completed to the Cascade summit by the end of 1918, but this work was also postponed.

When these two sections of the road are completed there will remain an unfinished gap of 8 miles between the White River ranger station and Chinook Pass.

State road No. 5, or the Cowlitz-Natches road.—The act of the Washington State Legislature establishing this road specifies that it shall begin at Riffe post office in Lewis County, thence up the Cowlitz River and its tributaries, by way of Casmas and Randle, by the most feasible route to a connection with the McClellan Pass highway.

The most feasible route for a connection with the McClellan Pass highway is up the Ohanapecosh River to Cayuse Pass, and in all probability this will be the route selected.

Caron River road.—The Pierce County commissioners have allotted funds to start construction of this road from Carbonado to the end of the Northern Pacific Railroad at Fairfax. When this road is completed and extended into the park, the distance from Seattle to Carbon Glacier will be less by 40 miles and 20 miles, respectively, than to the Nisqually and Emmons Glaciers.

The length of road from the western boundary of the park to Carbon Glacier is about 7 miles. A location survey of this was made in October, 1915, and the estimated cost under conditions at that time was $7,500 per mile. The road follows the south bank of Carbon River on grades from 2 to 6 per cent, mostly through large timber, some of the trees measuring 11 feet in diameter. The Carbon River and mountains to the north are visible from many points along the line, and on the upper end the Carbon Glacier and the north slope of Mount Rainier can be seen.

Narada Falls, Cayuse Pass road.—In 1916 location surveys were made for a road from Narada Falls to connect with the McClellan Pass highway at Cayuse Pass.

Beginning at Inspiration Point on the Government road above Narada Falls, at an elevation of 4,852 feet, the proposed road climbs on a 3½ per cent grade for a distance of 1,600 feet, to top of the ridge, thence on a descending 6 per cent grade to Reflection Lakes, thence along the lake shore on a level grade, thence on a 6 per cent grade past Lake Louise and down through a series of switchbacks to the bottom of Stevens Canyon, crossing Stevens Creek at an elevation of 2,730 feet; the road then climbs on a continuous 6 per cent grade to the summit of Cowlitz Divide, at an elevation of 4,160 feet, thence on a 6 per cent grade along the eastern slope of the Cowlitz Divide to the forks of Chinook Creek and Ohanapecosh River; crossing the Ohanapecosh, the line then follows up the west side of Chinook Creek to Cayuse Pass, at an elevation of 4,650 feet. The line is 28.5 miles long, 7.63 miles being in the forest reserve outside the park boundary. The scenery along this proposed road is magnificent.

On the four switchbacks entering Stevens Canyon, the Mountain and Tatoosh Ranges are continuously in view, and at the end of the first mile you are only 600 feet from the point of beginning.

From Cowlitz River to the divide Mount Adams is in full view. Beyond the Cowlitz Divide the road passes through some cliffs, several hundred feet high, overlooking the hot springs. The remainder of the line follows through timber and crosses many deep canyons and clear streams.

The estimated cost of the road was $321,275.89, or $11,276.70 per mile.

Longmire Springs, Chinook Pass road.—In 1913 and 1914 a location survey was made for a road from Longmire Springs to Chinook Pass at the summit of the Cascades. This proposed road follows south of the Tatoosh Range, via State Creek, Lewis, and the Ohanapecosh River. For the most part it is outside the park, but has the advantage of a lower elevation and would therefore be open for travel for the greater part of the year, but has not the scenic features of the Stevens Canyon Route.

In the event that State road No. 5 is built up the Ohanapecosh, the connection between it and Longmire Springs would be made by one of these routes. If the Stevens Canyon route is selected, the location would follow around the end of Cowlitz Divide, but would run approximately on the level from Stevens Creek at the south boundary of the park to the Ohanapecosh Hot Springs.

Recommendations.—It is recommended that the construction of the Carbon River road and the improvement of the White River road be undertaken first and then the construction of a road to connect the south side or Nisqually with State road No. 5 or with the McClellan Pass highway in Cayuse Pass. These, of course, must be planned as projects to be undertaken at the end of the war.

CRATER LAKE NATIONAL PARK.

Alex Sparrow, Superintendent, Crater Lake, Oreg.

General Statement.

Crater Lake National Park was created by act of Congress approved May 22, 1902. (32 Stat., 202.)

It is located in Klamath County, in the southwestern part of Oregon, on the crest of the Cascade Mountains, and about 60 miles from the California line.

The nearest railway points are Medford, on the main line of the Southern Pacific, 83 miles distant, and Klamath Falls, 62 miles to the south, on a branch of the Southern Pacific leaving the main line at Weed, Cal. This branch of the railroad has been extended to Kirk, within 26 miles of the lake. From this point, as also from Medford, regular stage service is maintained, with special trips from Klamath Falls as required.

All first-class tickets between Oregon and California points are good via Crater Lake during the season, with addition of stage fare.

DESCRIPTION.

Crater Lake Park is approximately 13½ miles east and west and 18½ miles north and south and contains 249 square miles. The elevation varies from 5,000 to 9,000 feet. It is a broad platform lying at the summit of the range and surmounted by numerous volcanic peaks, among them Mount Scott, Timber Crater, Red Cone, Crater Peak, and Union Peak.

Crater Lake is one of the most interesting of great natural wonders. It is remarkable not only for its position and size but on account of its deep blue color, its clearness, great depth, the majesty of its encircling cliffs, and its wonderful geologic history.

It lies in a great basin or caldera, formed, it is supposed, by the subsidence of the upper part of a volcano, which has been named Mount Mazama. The lake is almost circular, with an average diameter of 5½ miles, and is completely girdled by precipitous cliffs rising sheer from the water to a height varying from 600 to 2,000 feet.

Crater Lake is said to be the deepest body of fresh water in America, having the remarkable depth of 2,000 feet. Soundings show the lake bottom to be largely a plain, rising in the west into several peaks, only one of which appears above the surface of the water. This is Wizard Island, a cinder cone, which reaches a height of 800 feet above the water and has a crater 100 feet deep. Nearly one-third of the lake bed is more than 100 feet below the level of Klamath Marsh, at the eastern foot of the Cascade Range. The surface of the lake is 6,177 feet above sea level. There is no visible outlet. The temperature varies little, being uniformly about 38°.

There are many other points of interest in the park, notably three beautiful canyons, called Anna Creek, Castle Creek, and Sand Creek. In the last named are found wonderful sand pinnacles.

From Garfield Peak, which overlooks the lake, can also be seen the beautiful Klamath Lake region to the south. Glacier Peak and The Watchman are on the western rim of the lake, and Mount Scott towers to a height of about 9,000 feet near the eastern border. Union Peak affords a view of the whole park.

BOATING AND FISHING.

Visitors to Crater Lake may enjoy boat trips, launches and rowboats being provided. Trips to Wizard Island are made by launch on regular schedule, and special trips as requested around the island to Phantom Ship and around the lake shore.

The lake is kept well stocked with rainbow trout, and there is also fishing in Anna Creek below the falls. In the lake fishing is permitted only with hook and line, and each fisherman is limited to five in one day.

GAME.

The park abounds in black and brown bear, black-tailed deer, pine marten, porcupines, grouse, pheasants, and numerous varieties of birds. Deer and bear are more plentiful each year and are growing quite tame. Cougar, lynx, timber wolves, and coyotes are seen occasionally, and every effort is being made by the ranger force to exterminate them.

ACCOMMODATIONS.

Crater Lake Lodge is located directly on the rim of the lake 1,000 feet above the water. It is an attractive building of cut stone, containing about 60 rooms, and affording very comfortable accommodations for travelers.

Five miles from the lake, at park headquarters, Anna Spring Camp is maintained at cheaper rates. There is a store here, where groceries, gasoline, and other supplies are obtainable. Gasoline and motor oil can also be purchased at the three park entrances.

Throughout the park the public are allowed camping privileges in designated places, subject only to the regulations of the National Park Service.

TRAVEL.

The light snowfall of only 10 feet last winter, combined with warm weather early in the spring, made it possible for automobiles to reach the lake June 18, which was one month earlier than the preceding year. This enabled many of the early tourists to visit the park who would not have done so otherwise. As a result the travel record is heavier than that of any year so far.

TRAVEL FOR THE YEAR ENDING OCTOBER 12, 1918.

Pinnacles Road	1,193
Fort Klamath Road	5,625
Medford Road	6,413
Total	13,231

Means of transportation.

Crater Lake stage	516
Automobiles	11,471
Wagons	1,022
Motorcycles	10
Mounted on horse	185
On foot	27
Total	13,231

Motor vehicles.

Pinnacles Road	267
Fort Klamath Road	1,305
Medford Road	1,533
Total	3,105

RANGER SERVICE.

The ranger force consists of seven temporary rangers; one is employed throughout the year at headquarters, three on mounted patrol, and three dismounted at checking stations.

One temporary clerk-stenographer is employed during the working season.

WATER SUPPLY.

Park headquarters is supplied with water from Anna Spring. A hydraulic ram pumps the water into a 5,000-gallon tank 40 feet higher than the buildings, which receive their supply by gravity. The east and west entrances are supplied from Sand Creek and Castle Creek, respectively. A 200-pound pressure pump connected with a two-horsepower gasoline engine and a 1,000-gallon tank is installed at each place. The lift at Sand Creek is 230 feet and at Castle Creek 220 feet. At the south entrance the ranger carries water one-fourth mile from a spring in the forest reserve. This is the first season that the spring has been known to go dry, necessitating the making of a trail down to Anna Creek, over which the ranger now carries water. There should be installed at this place a water system similar to the ones at the east and west entrances, but it would be unwise to purchase equipment at this time, for when the road construction is finished there should be pumps, engines, tanks, and pipe to spare, and it is suggested that a water system be installed with the surplus equipment that may be available at that time.

Funds are now available for a water system to supply public camps at the rim of the lake. Equipment and material was ordered as early as possible, but delivery is slow, and it is doubtful if the pump will be received in time to be installed before winter. However, it will be ready for the 1919 season.

Crater Lake Lodge is supplied from a spring about 2,500 feet south and 400 feet lower than the lodge. The water is pumped by a hydraulic ram, with a pump and 4-horsepower gasoline engine as an auxiliary, to a 3,000-gallon tank near the lodge. It is again pumped into a 1,000-gallon pressure tank for delivery to the lodge. There are some weak points in this system. It sometimes fails, and considerable fault could be found with it.

All the water in Crater Lake Park, including that of the lake, is exceedingly cold and clear, and has been found by scientists to be exceptionally pure.

TELEPHONE SYSTEM.

The Park Service controls 20 miles and the United States Engineer Department 34 miles of telephone line in the park. The Engineer Department has 14 miles of line outside the park, connecting the eastern entrance with Kirk, at the end of the railroad.

The west entrance is connected with a line to Prospect, 18 miles, in which the park holds considerable interest. This line is valued principally for fire control and also to receive reports of stages and travel coming in from the Medford side. Twelve miles of this line is through the forest reserve, and by mutual agreement the Forest Service maintains 9 miles of it.

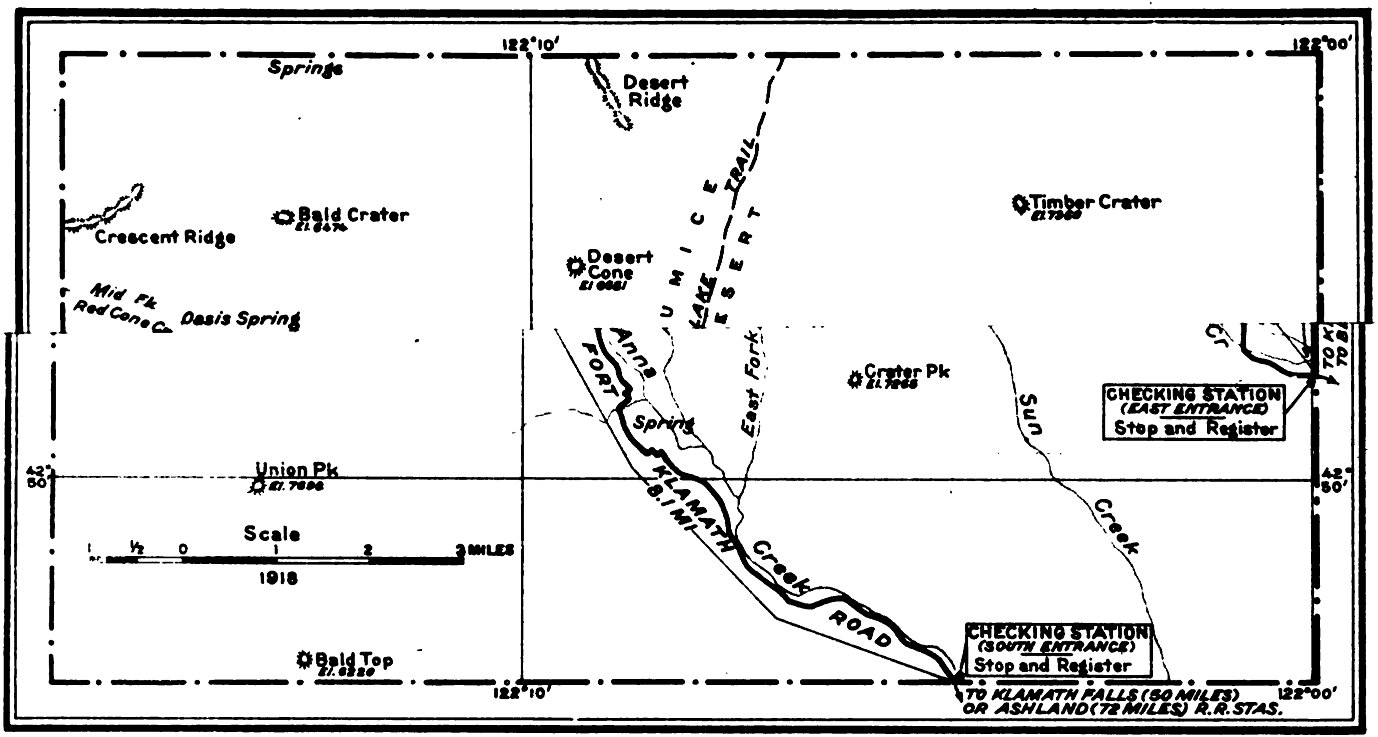
This line was built by a community of interest—private contributions and some assistance from Jackson County. A movement has been started which may result in the complete control of this line by the Park Service.

All service over the park lines, including that to Kirk and Prospect, is free, and, considering the temporary nature of much of the line, the service is very good.

The park system connects at the south entrance with the Klamath Telegraph & Telephone Co.'s line to Fort Klamath, 9 miles. A three-year contract has been made with this company, whereby they have free service over all park lines, in exchange for which they maintain 8 miles of line from the south entrance to park headquarters for 10 months and 5 miles of line from headquarters to Crater Lake Lodge for 4 months each year. They also keep telephones in repair on this line and give free service for all Government business between the park and Fort Klamath.

ROADS.

There are four roads in the park system, known as Pinnacles, Medford, Fort Klamath, and Rim Roads. The Pinnacles Road, 3.25 miles, connects the east entrance with the Rim Road at Lost Creek. The Fort Klamath Road, 11.4 miles, connects the south entrance with the Rim Road at Government Camp, 2 miles south of Crater Lake Lodge. The Medford Road, 6.84 miles, connects the west entrance with the Fort Klamath Road at park headquarters. These three roads have been open for travel since 1915, and are in good condition for dirt roads. The Rim Road, 35 miles, circles the lake. From Cloudcap to the Watchman, 21 miles, it has been open for travel since 1916, and is in fairly good condition for a dirt road. However, considerable improvement work will be necessary before the 14 miles connecting Cloudcap and the Watchman, via the north



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MAP OF CRATER LAKE NATIONAL PARK

side of the lake can be utilized. The 1919 season will be well advanced before this road can be used for the full 35 miles by the traveling public, but when completed it will afford a drive of unsurpassed beauty. The total length of roads in the park is 57 miles, and the maximum grade is 10 per cent. Many sandy stretches are encountered on the Rim Road which should be given a liberal supply of pumice gravel as soon as funds are available for such work.

TRAIL SYSTEM.

The following-named trails make up the park system: The Watchman, 3.5 miles; Garfield, 1.3 miles; Lodge to lake, 1.2 miles; Wizard Island, 0.75 mile; Dewie, 2.05 miles; to Rim, south side, 1 mile; park headquarters to Rim, 4 miles; Copeland Creek, 2.2 miles; Union Peak, 4 miles; Red Blanket, 2 miles; total, 22 miles.

A trail of very easy grade, on which horses and burros are now used, leads from the Rim near Crater Lake Lodge to the water a descent of 900 feet, and visitors to Wizard Island find a good trail to the crater.

There is an excellent trail to the top of Garfield Peak. The one to the Watchman is a winding trail, passable for horses, and the lake is in full view for the entire distance.

The Dewie trail is passable for autos. It affords a good view of Anna Creek Canyon and Dewie Falls.

An easy trail to Union Peak will be open for 1919 season. It will be passable for light vehicles for about 3 miles. The remaining distance to the base of the peak will be a good horse trail. The last one-fourth mile to the top of the peak must be made on foot. It is very steep, but the footing is good and the climb is easy. It ascends 700 feet in one-fourth mile. The view from the top of the peak is well worth the climb.

The Red Blanket trail extends past Union Peak to Bald Top and Red Blanket. It was constructed this year. It is very rough and steep. It connects with a ranger trail in the forest reserve near the southwest corner of the park. It is valuable as a patrol trail and also in case of fire.

FOREST FIRES.

The exceptionally early spring, followed by two months of dry and windy weather, made the control of fires a very difficult problem

Up to September 5 nine fires have occurred during the season. Seven of these were in the park, and two so close to the boundary that we assumed charge of them. Six of the fires were caused by lightning, one by campers, and two were of undetermined origin. Of all, only three fires were of any consequence. About 200 feet of small lodge-pole pine was burned close to a road. In no other case was the scenic beauty of the park affected. The total area burned was less than 2 square miles, and this was principally snow brush and lodge-pole pine of no commercial value.

RECOMMENDATION.

In view of the extreme shortage of labor and the high price of materials, I would suggest that no new work be undertaken for the present. However, there is a lot of improvement work to be done on the Rim Road before it can be used for its entire length. It is important that this road be finished and kept in good condition, as the trip of 35 miles around the lake will be an attraction second only to the lake itself.

It is 10 years since the park was surveyed, and the brush has grown up until the lines are almost obliterated. It is very easy for people not familiar with the country to ramble across the boundary in quest of game, and they have some foundation for argument when they claim they did not know they were in the park. The brush should be cut and burned to a width of 8 to 10 feet around the entire park, 65 miles. It could be cut during the summer and burned late in the fall or in early spring. This would serve as a fire lane and trail and would eliminate all argument with poachers.

This park will not be complete until it includes Diamond Lake, Mount Thielsen, and Mount Bailey. An extension of the boundary 9 miles northward would include the necessary area.

Diamond Lake is 5,200 feet above sea level and is almost rectangular, 2½ by 5 miles, its south end being 5 miles north of the present park boundary. It is beautifully located and furnishes an ideal camping ground. To the east and south the shore is grassy, with a gradual slope to a pebbly beach, making it possible to walk or ride into the water, which is shallow for some distance. By reason of its shallowness, the water becomes warm enough for comfortable bathing.

This lake offers a strong contrast to Crater Lake, in which bathing is out of the question and which is reached only by a trail built at considerable expense.

Two remarkable creeks flow into Diamond Lake at the southern end. Silent Creek has a swift but absolutely noiseless current. Short Creek rises in a large spring less than 200 yards from the lake. Two Bear Creek empties into the lake from the north.

Mount Thielsen is directly east, and Mount Bailey west of Diamond Lake. The region comprising these three scenic attractions rightfully belongs to the park not only as a recreation ground but as a game preserve.

Crater Lake Park is too small for a game preserve. Many of the deer get quite tame and it seems like murder to kill them when they stray across the boundary. One case in point occurred recently during the hunting season. Voley Pearsons, of Klamath Falls, shot a doe on the road about 300 yards outside the southern entrance to the park. The doe had frequently visited the ranger's cabin and was so tame that it would not run when an auto approached. As it is unlawful to kill a doe at any time, the man was arrested by the Park Service and turned over to the local authorities at Fort Klamath, where he was fined $25 and costs. This case is cited only as evidence of the necessity of enlarging our game preserve.

WIND CAVE NATIONAL PARK.

T. W. Brazell, Superintendent, Hot Springs, S. Dak.

GENERAL STATEMENT.

The act of Congress approved January 9, 1903 (32 Stat., 765), made reservation of a tract of land in South Dakota, comprising 10,522 acres, to be known as the Wind Cave

National Park. When this act was passed there were several tracts of patented lands within the boundary, but the Government has secured title to all such lands and is now in exclusive control of the entire area.

The park is almost square, and in extent about 4 miles square. It is located in a semimountainous region, on the southern slope of the Black Hills, in the southwestern corner of South Dakota, about 36 miles from the southern boundary and 24 miles from the Wyoming line. The altitude at headquarters is 4,030 feet and portions of the mountains west of the cave are 4,700 feet high.

The park is under direct control of a superintendent—the only regular employee. During the summer season two or three rangers are employed, chiefly for guide service in the cave

THE CAVE.

The chief attraction of the park is the cave, entrance to which is near the center of the park and about 11 miles north of Hot Springs, the most accessible railroad point. The Burlington and the Chicago & North Western have regular service, with east and west connections, to Hot Springs, and many of the visitors to the park come from this town.

The cave has been made accessible to the public by the working out of passageways to admit of easy travel; it has also been necessary to build several stairways, landings, railings, and bridges within the cave. The lower levels to which visitors are conducted are possibly 480 feet below the entrance, and the aggregate length of all routes now open to the public is approximately 3 miles.

There is a spring and miniature lake in one place, but aside from this the cave is without moisture except from condensation of atmosphere, and here and there some seepage from the surface. The various formations within the cave are most wonderful exhibitions of diversified beauty and the inimitable work of nature.

The extent and number of the various crevices, cross-passages, and chambers which make up the cave no one knows nor can anyone intelligently guess, though we do know that the part open to the public is a very small fraction of that part which has been explored, but not surveyed. Beyond this, the wildest guess is admissible.

VISITORS.

The number of visitors to the park has increased annually until this year, when a falling off is noticed, due largely to frequent and excessive rains, which have kept the roads in almost impassable condition, and partly to war activities, which, no doubt, deterred many from coming to the park.

There were 14,431 visitors to the park this season, 13,441 coming in 4,815 private automobiles. Of this number, 3,168 visitors made the trip through the cave.

Every State in the Union has been represented by visitors, and many of the foreign countries, though a very large proportion are from this and near-by States.

It is the custom for authorized guides to conduct visitors through the cave, and as a trip requires about two to three hours, but two trips a day are undertaken. The established times of entrance are 9 a. m. and 2 p. m. daily, except in the off season (Oct. 1 to Apr. 30), when but one trip each day is made—the afternoon trip.

Signs have been provided at various conspicuous points on the popular highways leading to the reservation, which inform the public of the schedule time of entrance to the cave, in order that they may time their arrival at the park so as to make the cave trip without needless delay to their itinerary or disappointment at being too late to go in. It is hoped these signs will fulfill their mission, which is to notify all prospective visitors that they can not go in the cave except at the regular hours of 9 a. m. and 2 p. m., before they have arrived at the park.

ROADS AND BRIDGES.

The main road through the park, comprising 6 miles, constitutes a portion of the Denver-Deadwood highway, the Black Hills portion of which is famed for its beautiful and varied scenery.

From headquarters south to park line the road is at present in first-class condition, much work having been done thereon the past year. A large proportion of the park road is rocky, the soil throughout the park being interspersed with ledge rock and cobble stones. Maintenance of the road this season has been very expensive owing to the frequency of very heavy rains, which caused washouts at crossings and exposure of rocks by erosion of soil on large portions of the road, making it difficult to repair, the only feasible method on a large part of it being to haul dirt and cover the rocks.

One of the four large bridges (No. 4) has been replaced by a permanent earth fill with a masonry arched culvert for spillway, and quantities of rock have been hauled for similarly improving other crossings. Much of the road has been raised and widened, curves and grades have been reduced, and all maintenance work is planned so as to be a direct contribution to a permanent good road through the park. While to maintain in safety all bridges and parts of the road requires some expenditures which seem thrown away, they must at times be made, but such expenditures are held to the minimum.

BUILDINGS.

The park buildings consist of the superintendent's residence, administration building, house over cave entrance, barn, auto shelter, camp pavilion, and blacksmith shop.

The residence was improved by the addition of two rooms and bathroom during the year and by installation of hot-air heating plant, closet, lavatory, and bath.

All buildings were repainted on the outside, except the auto shelter, which was only recently constructed and is shingled on sides as well as roof. This improvement provides shelter for 10 cars, when full, and has been of immense benefit to visitors this season.

OTHER IMPROVEMENTS.

Inside closets (antifreeze) have been installed in the administration building, and modern septic vaults and disposal drains have been provided for the reception of sewage from both residence and administration building.

The supply pipe from spring to storage reservoir was taken up, inspected, and replaced to a depth of 4 feet from surface, for protection from frost; there is almost a half mile of this supply-pipe line.

A cement cover was built on the supply spring, a roomy corral was built, a neat footbridge across gulch from administration building to statue was built and painted, an iron rail fence (two-rail) was built around McDonald's statue, and a two-rail iron guard from the administration building north to bridge. There was also built a cement crossing in the street, a driveway or platform in front of administration building, a walk from front around to rear of residence, a new specimen case, nearly 200 linear feet of new stairs and landings in the cave, a dam which creates a lake about 3 acres in extent, 3 miles of stock fence on the park range, a fence inclosing residence yard. Considerable grading was done at headquarters, and various other minor improvements were made. The park also paid half the cost of a telephone line from this office to the game preserve.

WATER SUPPLY.

The source of water supply is a spring, about one-half mile west and 150 feet higher than the park residence. A pipe line serves to conduct the water from the spring to a supply reservoir of rock and cement construction, capacity 450 barrels, which is located near headquarters and at an elevation above the buildings of 70 feet. Water is conducted from reservoir to the various outlets where needed, by gravity; and also from the spring to the reservoir. The capacity of the spring is about 75 barrels a day, which is ample for all park needs. The water is excellently pure, and a drinking fountain serves the public.

STREAMS.

There is a running stream which skirts the northern boundary, meandering on and off the park. This is generously stocked with trout.

BIRDS.

More than 60 varieties of birds are found here at some time of the year, and all—more particularly those classed as game birds—are noticeably tamer than they are outside the park. Many kinds of birds stay the year round, but most are migratory.

The bobwhite, yellow-legged prairie chicken, and pin-tailed grouse are present, and the crop of grouse and prairie chickens this season is gratifyingly large.

PREDATORY ANIMALS.

Coyotes and bobcats (lynx) are common, but owing to persistent work of the game preserve authorities who had expert trappers here last winter, the efforts of the park management and adjacent ranchers are growing less numerous. These animals rove a great deal, and killing them all in a certain locality does not prevent others from coming in from other parts.

Weasel, mink, skunk, and porcupine are found here, the first two being rare, but the latter numerous. The weasel, mink, and coyote are a menace to bird life, though the magpie, a very pretty bird itself, is much the worst enemy to bird propagation in this vicinity, as its habit of robbing other birds' nests of both eggs and young is very apparent. The magpie's best use, from a bird-lover's point of view, would be the adornment of women's hats, and the laws should be amended to permit such practice.

GRAZING.

By limiting the number of cattle permitted to graze on the park lands, a very appreciable gain in the annual production of beef is apparent, and from the same cause the park range has been materially improved. A system of regulation whereby the park grass is caused to produce 200,000 pounds of beef, as was the case last year, seems worth while. Heretofore, owners of stock, in their zeal to get something for nothing, had, in this locality, overstocked the range, which was practically free, to the extent that cattle were poor, even at the close of the grass season.

Until recently an almost valueless class of horses were tolerated on the park range. It was evident these horses were consuming, without economic gain, grass that was badly needed for and would produce thousands of dollars' worth of food, and as a war measure, the time being propitious, a policy of excluding horses from grazing on the park lands was adopted and is being rigidly enforced.

There is keen competition for permits to graze on the park lands, and a precedent is now established giving preference to renewals when alloting the privileges.

It is evident that the production of beef from the park grass will this season exceed that of last year, which is gratifying, especially at this time.

NATIONAL GAME PRESERVE.

A national game preserve has been established in the Wind Cave National Park under the provisions of an act making appropriations for the Department of Agriculture for the fiscal year ended June 30, 1913, approved August 10, 1912 (37 Stat., 293), as follows:

For the establishment of a national game preserve, to be known as the Wind Cave National Game Preserve, upon the land embraced within the boundaries of the Wind Cave National Park, in South Dakota, for a permanent national range for a herd of buffalo to be presented to the United States by the American Bison Society, and for such other native American game animals as may be placed therein, the Secretary of Agriculture is authorized to acquire by purchase or condemnation such adjacent lands as may be necessary for the purpose of assuring an adequate water supply, to inclose the game preserve with a good and substantial fence, and to erect thereon all necessary sheds and buildings for the proper care and maintenance of the said animals, $26,000, to be available until expended

WILD ANIMALS.

As a natural game preserve there is only one animal, the deer, that has come under the protection of the park. These are present in small numbers throughout the year. There are at least three deer within the game inclosure and probably more.

The game inclosure comprises nearly 4,000 acres and is in the northwest corner of the park, which is the timbered portion, and contains bison, elk, and antelope numbering at this time (from Warden Chambers's report) 42, 80, and 15 head, respectively.

The Wind Cave National Game Preserve is in charge of a warden, Mr. A. P. Chambers, and is under control of the Biological Survey, Department of Agriculture.

DAMAGE TO PARK.

In July, 1917, lightning started a fire in the timbered area within the game pasture, causing a timber fire over about 50 acres before it could be controlled. The damage caused, however, was slight, as not all the trees within the burned area were killed. On October 9 a prairie fire occurred on the eastern edge of the reservation. It was confined to a small fraction of the area of the range and was extinguished with but little damage to the range.

PLATT NATIONAL PARK.

F. A. Sneed, Superintendent, Sulphur, Okla.

GENERAL STATEMENT.

By the acts of Congress of July 1, 1902 (32 Stat., 641), and April 21, 1904 (33 Stat., 220), 629.33 and 218.98 acres, respectively, at the town of Sulphur, Okla. (then Indian Territory), were segregated as the Sulphur Springs Reservation, which designation, by joint resolution approved June 29, 1906, was changed to "Platt National Park."

The park, with a total area of 848.22 acres, extends in irregular form a distance of approximately 3 miles from northeast to southwest along Travertine Creek, including a portion of Rock Creek, into which Travertine empties, and it has a circuit of 9 miles.

There are within the park a number of known mineral and three nonmineral springs. The principal groups of these springs are the Bromide, Medicine, and Sodium-Chloride Springs, in the extreme western part of the park; the Beach, Pavilion, and Hillside Springs, in the north-central portion of the park; and the Sulphur-Bromide, Black Sulphur, and Wilson Springs in the south-central section of the park. Sulphur springs predominate.

The Antelope and Buffalo Springs, nonmineral in character, are situated at the extreme northeastern end of the park, with an elevation of 1,080 feet above sea level at the Antelope Spring and 1,078 feet at the Buffalo. They have an approximate discharge, when normal, of 5,000,000 gallons daily into Travertine Creek, and are the source of this beautiful stream. A number of other springs in the bed of the creek add to the volume of water which glides down the stream and forms its pretty waterfalls.

The Medicine Spring had been confined since its discovery, but was still subject to overflow by Rock Creek until recently, when I made improvements to it, which will be discussed in the proper place in this report.

VISITORS.

During the present season this section of the country has experienced an unusual drouth, and June was about the warmest month I have ever known here. I feared this kind of weather would prevent visitors from coming to the springs, but during July, August, and September we have enjoyed cool breezes, especially in the late afternoons and at nights, as well as during a great many of the days. From June 4 to August 21 not one drop of rain fell here, but on August 21 and 23 we had more than 2 inches of rain, and the weather has been delightful since that date. Neither the lack of rain nor the weather conditions of any kind, however, have influenced the travel in the park, so far as I can ascertain. There have been more people here this year than last, and I estimate that about 36,000 people visited the park during the year.

There were registered in the park office during the year 1,265 persons who came into the park and camped for three days or more.

As shown by the records of the laborer at the Bromide Springs pavilion, the visitors there during the year just ended numbered 192,315. This total is made up from day to day of visitors and resident citizens who make frequent trips to the springs and does not represent as many individuals.

During the year a total of 38,788 gallons of Bromide water was taken from the spring by visitors, as well as 17,273 gallons of Medicine water and 5,210 gallons of Sodium-Chloride water. There was shipped from the springs 3,582 gallons of Bromide, 1,175 gallons of Medicine, and 950 gallons of Sodium-Chloride water, making a total of all the waters taken from the springs during the year of 66,987 gallons.

REPAIRS TO MEDICINE SPRING.

For some years, in fact ever since the discovery of the Medicine Spring, it has been subject to overflow by Rock Creek, and after every rise in the creek the waters of this spring were contaminated, necessitating its being emptied and cleaned out. During the spring months, and often during the winter and fall, this was of such frequent occurrence that I felt further repairs and improvements should be made to this spring which would in future avoid this continued contamination and the essential cleaning out. During the latter part of the fiscal year just ended I built a cement inclosure 4 feet and 4 inches square by 6 feet high around this spring, with a manhole frame and cover to serve as an opening, so that it may easily be cleaned out when necessary. This inclosure will serve to thoroughly protect the spring from overflow and will prevent its being contaminated. I also had a new pipe line laid from the spring to the bromide pavilion in place of the old pipe, which had become almost useless and was continually breaking. This will eliminate continued cost to repairs which had become necessary with the old pipe.

Inside the bromide pavilion I have placed two new earthenware containers for the bromide and the sodium-chloride waters. During the cold weather last winter the jar for the bromide water was broken from freezing, and there had never been a jar for the sodium-chloride water. Because of the fact that all the waters carried into this pavilion have to be pumped from the springs into containers, and because of the medicinal qualities of these waters, which rapidly eat through a metal vessel, it is necessary to have these earthenware jars; otherwise, the corroding metal containers might have some effect on the properties of the waters.

CAUSEWAYS.

During the fiscal year just ended I had cement causeways constructed at every creek crossing on Travertine Road, the sizes and locations being as follows:

At the location where the "Y" road comes down from the city of Sulphur and crosses Travertine Creek at intersection with Travertine Road, the first crossing on the road, the causeway built is 105 feet by 16 feet by 2½ feet.

At the second crossing going east in the park, below Panther Falls and the park swimming pool, there has been constructed a causeway 85 feet long by 15 feet wide and 3½ feet thick.

At the Sycamore Falls crossing the causeway constructed is 48 feet by 14 feet by 3½ feet.

At the crossing east of Lake Placid, which is the first crossing on the creek below the Antelope Spring, the causeway is 42 feet long by 14 feet by 2 feet.

The dimensions of the causeway on creek crossing on the south side of the loop on Travertine Road, and which is the last crossing on the road, are 37 feet by 14 feet by 2 feet.

These causeways have greatly increased the popularity of this road for automobile travel. They do away with the necessity of changing gear so often along this short drive, and there is no longer danger of flood waters of the creek making these crossings impassable. I believe no other improvement to the park has been more appreciated than these causeways, and I am sure none has been of more benefit to the visitors who come here.

There now remains but one creek crossing in the park along the general road system where there is no causeway, and at some time in the near future I hope to be able to provide this crossing with a cement causeway. This is at the Rock Creek crossing on Bromide Lane where this lane intersects the new Bromide Road. When this has been constructed, the present road system in the park will have been completed, with the exception of the surfacing of a short piece of road and the constant keeping of the entire road system in good repair.

SWIMMING POOL IN TRAVERTINE CREEK.

When I made my last annual report I had begun the construction of a dam across Travertine Creek at Sylvan Cove, just below Panther Falls, for the purpose of enlarging the swimming pool at this location, the dam being 67 feet long by 6 feet high and 4 feet wide at the bottom, sloping to a 3-foot width at the top. The allotment for this work having been made from the park revenues, I was able to carry this work over into the new fiscal year, and during the early part of the fiscal year just ended I completed the dam, and the swimming pool was available for use during the summer of 1917. I provided small dressing rooms built of uprights with canvas stretched around them for a temporary makeshift during that summer, and had hoped to improve these with better facilities, but the extreme drought during the 1918 summer stopped the flow of the Travertine Creek during the season just past, and there was no use for them this year. During the previous summer, however, the visitors to the park were much elated over this pool and enjoyed it to the utmost. During the season just past private pools at artesian wells in the city have provided visitors with swimming advantages.

BUILDINGS IN THE PARK.

But few repairs or improvements have been made to the buildings in the park during the last year, for the reason that they were all in fairly good condition and work on them was not essential. I did, however, build a small sleeping porch on the south side of my residence, screening in a portion of the porch already built on that side of the house, and I repaired the floor which was badly decayed. The dimensions of this sleeping porch are 42 by 7 feet, and it required 42 running feet of screen wire 4 feet high to inclose it.

TIMBER.

During the year past I had men busy for several months taking out the dead timber in the park and trimming off the dead branches of trees that were otherwise in good condition. I wanted, if possible, to save every tree that was likely to be damaged by the conditions that had killed some of their branches. I had a tree expert busy at this work for some months with his assistants, and a great deal was accomplished. However, the unprecedented drought has caused the park to suffer a great loss of trees. Since the rains last month some of the young trees give the appearance of being still alive, but some of the matured trees, which were doubtless already affected by tree diseases and age, we have lost entirely. I did everything possible to save as many of these as possible by protecting their roots and conserving the moisture, and by watering them where it was possible to do so, but it was impossible to take care of them all.

ROADS.

I had very little work done to the park roads during the last year because of the peculiar weather conditions. During the winter we had so much freezing weather that it was impossible to do anything with the roads, and it was useless to put new dirt on the roads during the extremely dry weather because the kind of road material we have in this park is such that during dry weather it pulverizes and blows away with the high winds of this part of the country. During times when there is any kind of rain, however, it makes the most excellent roads, and during the spring and fall months I did make such repairs as were absolutely necessary. Fortunately, the roads have been in fairly good condition and did not require a great deal of attention.

ANTELOPE AND BUFFALO SPRINGS.

Under date of July 25, 1918, I advised the Service that both the Antelope and Buffalo Springs, which constitute the source of Travertine Creek, had ceased to flow, and that the entire creek bed had become dry with the exception of a distance between Bear Falls and the point on the park map indicated by bench mark 963. This section of the creek is supplied by cold springs in the bed of the creek near the Bear Falls.

The Antelope Springs lost half of their volume in December last and ceased to flow entirely in January of the present year, and while the Buffalo Springs continued to flow at about one-half of their usual capacity from January until the month of March, at that time they also failed entirely.

This is the third time within my knowledge during the past 27 years that these springs have failed to flow; the first time in 1911, when the Antelope stopped running in March of that year and the Buffalo discontinued flowing in June. These springs resumed their flow on April 7 and 28, respectively, of the year 1913, flowing only at a very limited ratio of their normal capacity; and they continued to flow until the 18th of September of that year, when they again stopped and the creek was dry as at the present time (with exception of the short distance named above, below Bear Falls) until the latter part of November, 1913.

From the last-named date until January of the present year these springs continued to flow, generally at about their normal rate. Since January last, however, they have shown no disposition to flow again

The old settlers around here told me, when I first came to this locality 27 years ago, that these springs had failed once before, as I remember it, in the year 1891.

Inspector M. L. Dorr, of the Interior Department, was here in the early fall of 1912 and made recommendations that wells be drilled at both the Antelope and Buffalo Springs, going down deep enough so as to reach a sufficient supply of water to avoid having the Travertine Creek dry at any time. It has never been ascertained exactly what causes these springs to cease flowing at times, but I feel sure that the water course has not been diverted underground from the fact that the springs come back after each season of inactivity. but if it is possible to find a way to prevent this at any time I think it would be to the interest of the park to provide it, and I am making recommendation hereinafter in accordance with that made by Mr. Dorr.

PATRIOTIC CHAUTAUQUA.

Upon authority from your office, I granted the Redpath-Horner Chautauqua Co. permission to give their annual chautauqua in West Central Park during the first five days of July, and people came here from all over the country to hear the patriotic lectures provided by this company and to enjoy the other features of entertainment on the program. Each program was made up of patriotic numbers, and I felt that this chautauqua was a great benefit to this community in this time of war.

RED CROSS PICNIC.

With the approval of your office, I granted the local Red Cross chapter the privilege of holding a big picnic in the park as a benefit for the Red Cross on the Fourth of July. The local chapter advertised this over the entire county, secured donations of dressed chickens, kids, pigs, and young beeves, and served a barbecued dinner to hundreds of people. They held action sales of commodities, sold ice cream and soft drinks, and, besides the pleasure everybody derived from the picnic, the Red Cross made a net profit out of it amounting to $597.44.

FIRE IN PARK.

In spite of the dry weather we have experienced during the season just past there has not been a single fire in the park, the last one having been in March of 1917. attribute this to the fact that I have pastured the parts of the park where the growth of grass has been heavy, and have had the underbrush trimmed out.

ANIMALS IN PARK.

In the spring of 1917 the city of Oklahoma in this State presented to this park three fawns out of a surplus which they had on hand. There was one young buck and two does. They are the small white-tailed deer Recently twin fawns were born in the park so that we now have a herd of five deer, all of them quite tame. They will come up and eat from the hands of visitors and have their noses rubbed, and they have been a great source of pleasure and interest to people visiting the park. Numbers of pictures have been made of them by the visiting public.

The visitors also take many pictures of the blue jays and squirrels in the park. The squirrels are of the fox species, and are the only animal other than the deer in the park of interest to visitors, and these have increased greatly in numbers. They also eat from the hands of visitors, but will not allow themselves to be touched.

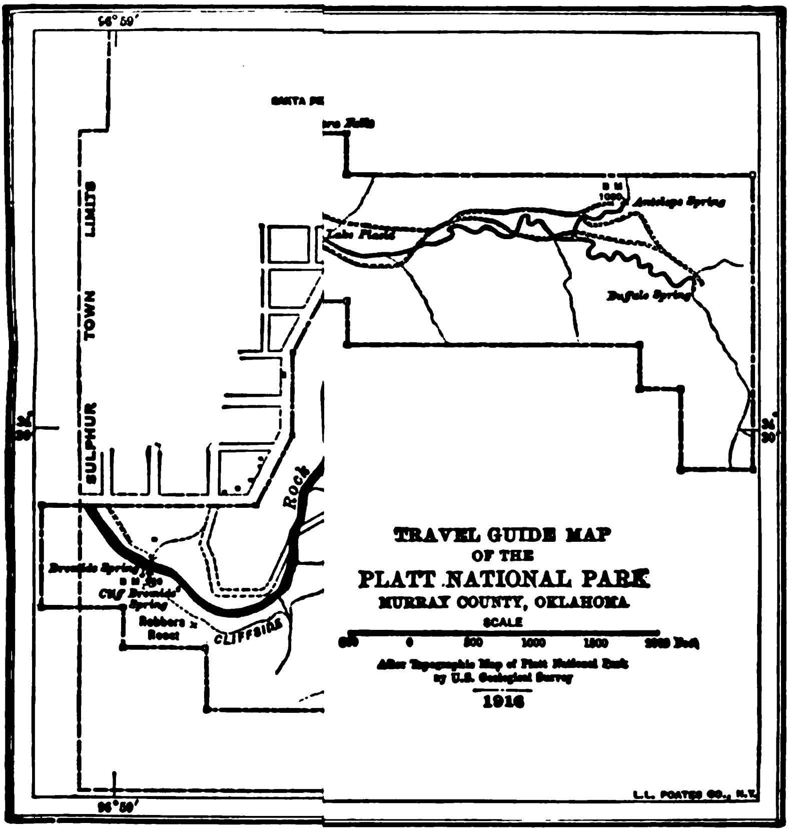
The blue jays, with their handsome crests and plumage, are also a source of entertainment to visitors. A flock of these impudent birds can always be found where people are feeding the squirrels, and they are almost as little afraid of people. Being quicker than the squirrels, they never hesitate to help themselves first.

WILD FLOWERS.

During the spring and fall months especially there are a greater variety of wild flowers in this park than any place I have ever seen. Botanists would find a great field for study here during normal years. These wild flowers are a great pleasure to visitors.

RECOMMENDATIONS.

I recommend the drilling of an artesian well approximately 400 feet deep near the Antelope Spring to provide water for Travertine Creek at times when the Antelope and Buffalo Springs fail. This well would probably cost upon an average of $2.50 per linear foot to drill and sink iron casing of 6-inch diameter. The casing would probably cost about $1.35 per foot, but it would not be necessary to sink casing beyond the rock strata, which, according to other wells drilled here, is about 150 feet below the surface.


TRAVEL GUIDE MAP
OF THE
PLATT NATIONAL PARK
MURRAY COUNTY, OKLAHOMA
SCALE
500
0
500
1000
1500
2000 Feet
After Topographic Map of Platt National Park
by U.S. Geological Survey
1916
96°59′
96°59′
34°30′
34°30′
SULPHUR TOWN LIMITS
Antelope Spring
B M 1000
Lake Placid
Buffalo Spring
Rock
Bromide Spring
B M 930
Cliff Bromide Spring
Robbers Roost
CLIFFSIDE
L.L. POATES CO., N.Y.

It is my desire also to drill a similar well at the Buffalo Springs, but I hope to be able to do this from the present year's appropriation.

For maintenance of the park (general and roads) I recommend an appropriation of $1,250. This is for the general upkeep of the park, fuel, electric lights, road repairs, etc.

For the superintendent's contingent I recommend that there be provided the sum of $750. This is to cover unforeseen work which could not be construed as being in the nature of construction work. It would be used for such purposes as repairs of storm damages, replenishing tools, implements, etc., repairs to plumbing, and any incidentals which could not have been anticipated.

I also recommend the purchase of a buggy for the superintendent's use in supervising the work on the park, and in the administration thereof. Since the beginning of the administration of this park by the Government, it has been necessary for the superintendent to provide his own vehicle for the uses above named. The buggy which I am now using is just about worn out and requires frequent repairs to keep it in running order. The size of this park makes it necessary that some sort of vehicle be used in the supervision of the work, and I feel that this Government prefers to provide its own facilities for the work.

In the recommendations above, I have confined myself strictly to the absolute necessities of the park, staying within the limit of the $8,000 which has generally been appropriated for this park. I have done this in accordance with your request that the estimates not exceed this amount.

It is impossible to accomplish many improvements each year in a small park where the annual appropriations are kept within the small sum of $8,000, with a part of this paid for salaries. It has been my ambition, since my incumbency as superintendent of this park, to make improvements which will prove of lasting benefit to it, instead of putting in many minor improvements each year in order to make a good report. With the small amounts at my disposal for expenditure, in order to follow my plan, necessarily each year's improvements can be told in a few words. The general effect, however, is beginning to show, and the opinion of the visiting public is that the park is much improved since I started this policy of putting in a few improvements worth while each year, and not making an effort to spread over the entire acreage with each appropriation.

This park is not one of uncommon scenic grandeur nor is it a park where wild animals are found. It is more in the nature of a health and recreative resort, along the line of the Hot Springs Reservation. Its scenic beauty is of the restful kind more than the impressive, and it is more of a refuge for overworked, nervous, or sick people than as a place for sight-seeing. It is the coolest place in the summer in the southwest, and as such it draws many people here who are well but who desire to escape the torrid heat of their own homes. Few mosquitoes are fonnd here, and altogether it is a most pleasant place for people of minor means to spend the heated term of the year.

MESA VERDE NATIONAL PARK.

THOMAS RICKNER, Superintendent, Mancos, Colo.

GENERAL STATEMENT.

The Mesa Verde National Park was established by the act of June 29, 1906 (34 Stat., 616). It is situated in the extreme southwestern portion of Colorado, in Montezuma County, and originally embraced an area of 66.2 square miles, or 42,376 acres, but by the act of Congress approved June 30, 1913, the boundaries of the park were so changed as to include an aggregate area of 76.51 square miles, or 48,966.4 acres.

Mesa Verde is a high table-land dividing the Mancos and Montezuma Valleys. This mesa is elevated above the valleys some 2,000 feet, and rises abruptly from their floors with precipitous sides like the walls of a canyon. The northern extremity of this great mesa terminates in Point Lookout, which juts out between the two valleys, a landmark for miles in all directions. The surface of this mesa is broken by innumerable canyons, which start from the very edge of the mesa on the northern and western sides and, growing deeper and more rugged as they descend, finally open out into the Mancos Canyon. These canyons have many great caverns in their side walls, with overhanging rock for roofs, and in the caverns are found the ruins of the cliff dwellers.

CUSTODIANSHIP.

The custody of the park is delegated by the Director of the National Park Service to a superintendent, whose office is maintained at Mancos Colo., the nearest railroad point to the park. The superintendent is assisted by a limited number of rangers, whose duty it is to act as guides through the ruins and to police the park. The best of order has been maintained and no violations of the rules and regulations have been reported.

TRAVEL.

Since automobiles have been admitted into the park, that mode of travel has superseded all others, and now very few horse-drawn vehicles enter the reservation. The long, hard drive with team is now reduced to a few hours' run with the car, and many parties make the trip to the park, visit a few of the principal ruins, and return in one day. Travel for the season of 1918 has not been quite up to that for the year 1917. A larger number of cars have carried camping outfits than has been the case in former years and a smaller number of tourists have come in by rail. Tourists registering in 1918, 2,058.

The number of private cars going into the park for the season of 1918, up to and including October 12, has been 371, and they have come from different States, as follows:

	Cars.		Cars.
Arizona	4	Nebraska	5
Arkansas	1	New Mexico	28
Colorado	285	New York	3
Idaho	2	Oklahoma	6
Illinois	1	Texas	6
Kansas	15	Utah	11
Mississippi	1	Washington	3
Missouri	5		

CONCESSIONS.

There is but one concession for hotel in this park, and the camp maintained under this has proved to be large enough to accommodate all visitors.

Two concessions for the transportation of passengers into the park have been granted, one for travel from Mancos and one for travel from Durango. The former handles all tourists coming in by rail as well as local visitors. The latter carries passengers only from Durango and immediate vicinity.

Grazing permits have been granted to three parties to graze cattle on those portions of the park remote from the ruins and camp.

SPRUCE TREE CAMP.

On the western side of Spruce Canyon, directly across from the big ruin, Spruce Tree House, is located Spruce Tree Camp. Here is the hotel building, containing lounge and dining room. Near by, on the brink of the canyon, is a picturesque log cabin with broad piazza overlooking the canyon and the old ruin, and giving a magnificent view to the south. This building contains a rest room, with ample stone fireplace and a room devoted to the display of relics. These relics, exhibited in glass cases, are all from the ruins in Mesa Verde Park.

Three rows of floored tents, on terraces, one above the other, are provided for the accommodation of visitors. The tents are equipped with all the comforts and are very attractive. The entire camp is electrically lighted and the power plant pumps the water of Spruce Tree Spring into a stone water tower above the hotel. Attractively constructed sheds for automobiles protect these vehicles from the weather. A camp ground just across the canyon is maintained, where parties can pitch their tents and enjoy the pleasures of camping out.

RUINS.

Among the best-known ruins and those easiest of access are: Spruce Tree House, in Spruce Canyon, directly across from the camp; Cliff Palace, in Cliff Canyon, 2½ miles from camp; Balcony House, in Soda Canyon, one-half mile beyond Cliff Palace; Sun Temple, on the mesa between Cliff and Fewkes Canyons, 2½ miles from camp; Oaktree House and Painted House, in Fewkes Canyon, under Sun Temple; Square Tower (Peabody) House in Navajo Canyon, 2 miles from camp; and Far View House, on Chapin Mesa, only a few rods from the road into the park and near Mummy Lake, supposed to be an artificial reservoir for the storage of water. Spring House and the natural bridge are reached by trail, about 5 miles from camp, in Long Canyon. Many tourists make the hike to this interesting point, and many more would go if it could be reached by automobile.

The Rock Spring section has a large number of interesting ruins of various types, some of them very extensive, and when this portion of the park is penetrated by a good road it will be a valuable addition to the pleasures of a sojourn here.

Cliff Palace, Spruce Tree House, Balcony House, Painted House, Oaktree House, Sun Temple, and Far View House have all been restored, and all parts of them are accessible to the tourist. In the restoration of these buildings no attempt has been made to restore them to their original appearance by constructing the fallen parts. They have simply been cleaned of all fallen stone and rubbish and the unsafe walls strengthened. Nothing new or modern has been supplied and the buildings stand in their ruined condition, only so cleaned out that the visitor can walk about them and in his own mind reconstruct them as his fancy dictates.

These ancient buildings show the wonderful achievement of a race of people who lived so long ago that no man can accurately estimate the date of their occupancy. Each one must construct his own theory of this race, and he can judge of them only by the work of their hands which remain to us to-day after the lapse of ages. No records of their lives are left except these silent evidences of their skill and workmanship. What were their lives, their aims, and ambitions can only be guessed at, and this park with its hundreds of ruins, presents a great field for conjecture. That they were a numerous people, their ruined homes scattered everywhere over this Southwest, testify. In the ages past, when this country was populated with this bygone race, this section had far more dwellers than at present; but they are gone, leaving no record of their existence other than their works which have so wonderfully withstood the ravages of time.

No one can visit this park and not feel the mystery and romance of it all. It appeals to the imaginative, and one visit to these old cities only stimulates a desire to see them again.

SCENERY.

The beautiful drive into Mesa Verde Park from Mancos is not the least of the pleasures one derives from a visit to the cliff dwellers' country. The scenery is varied and unsurpassed. Leaving the Mancos-Cortez highway, the traveler turns his back on all signs of the improvements of civilization. He steps at once into an unbroken wilderness where the road on which he is traveling is the only mark of man's handiwork. This road winds through a sagebrush country dotted with clumps of pinyon and juniper trees. After skirting the foot of Point Lookout, the most northerly portion of the park, the road commences the ascent of the mesa, zig-zagging along the hillside; always ascending, but nowhere at a heavier grade than 8 per cent, it reaches the top, passing through "The Saddle," and debouches into Morefield Canyon, near its head. From this part of the road one sees the Mancos Valley spread beneath him, checkered by the fields of hay and grain, the town of Mancos showing like a collection of dots upon the valley's floor. The La Plata Range of mountains looms high and rugged beyond, with Hesperus towering above all.

Through Morefield Canyon, across the divide and up Prater Canyon, the road comes back to the northern cliffs of Mesa Verde, and from this vantage point one can see the great Montezuma Valley, a vast plain of wild lands spotted with cultivated areas. Beyond and guarding this big valley is Ute Peak—"the Sleeping Ute"—beautiful in its solitude, rising abruptly from the plain, with no foothills to dwarf its height.

In the distance, soft and hazy, almost blending with the sky, rise the Blue Mountains, in Utah. To the north are the Rico mountains, snow tipped and rugged. Lone Dome

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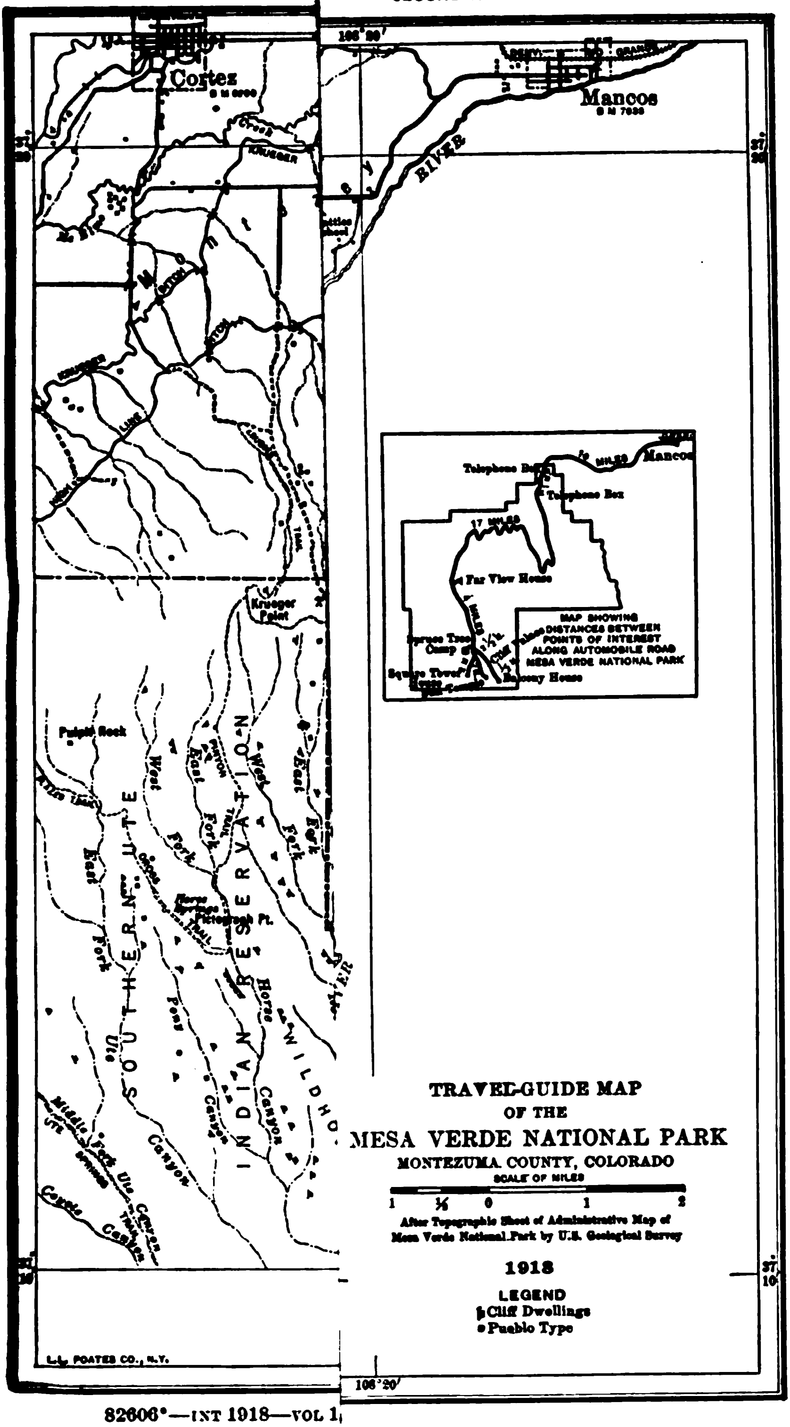


TRAVEL-GUIDE MAP
OF THE
MESA VERDE NATIONAL PARK
MONTEZUMA COUNTY, COLORADO

SCALE OF MILES

1 ½ 0 1 2

After Topographic Sheet of Administrative Map of Mesa Verde National Park by U.S. Geological Survey

1918

LEGEND
Cliff Dwellings
● Pueblo Type

lifts its head like some Egyptian pyramid. One can see from here the "Four Corners," the only place in the United States where four States have one common boundary—Colorado, New Mexico, Arizona, and Utah. From here the road heads numerous canyons, many times coming back to the mesa's edge, giving again and again a panoramic view of the Montezuma Valley and the mountain ranges beyond.

Away to the south the land stretches out until it seems to meet and melt into the sky. On this soft sea of blue Shiprock stands out and looks not unlike some monster brig with all sails set. Down the crest of Chapin Mesa the road leads through cedar growth, past Mummy Lake and Far View House, the wonderful old ruin excavated by Dr. J. Walter Fewkes in the summer of 1916, and finally, after making a turn, one sees the Stars and Stripes floating over the heavy growth of trees and knows that Spruce Tree Camp is reached. The many deep canyons, with their cunningly built homes and towns in the recesses of their walls, all add to the picturesqueness of scenery as beautiful as it is unique. The views from some of the ruins are superb, as the canyons in which the larger ruins are located are deep and precipitous.

ROADS.

The entire road system of the park has been kept up to a high standard of excellence. Fewer rains than usual during the summer months have made the matter of repairs less than in other years.

A new road ascending the mesa is now under construction, and the close of the season will probably see this work completed, when the present road, under Point Lookout, with its menace of overhanging rock, will be abandoned. This old road is one of heavy grades, is very narrow, and its many turns and windings under the cliffs have made it necessary to maintain a block system through the use of the telephone. No vehicles of any kind are allowed to meet on this strip of road, and if anyone is on this road no other party can ascend or descend, as the case may be, until the hill is clear. The new road will leave the Mancos-Cortez highway near the present branch, but will pass along the eastern side of Point Lookout, and ascend the mesa by easy grades on the Mancos Valley side of the hill. The road will be wider and through a country free from danger from above. It will join the old road at Station 64, at the head of Morefield Canyon. Besides being free from the dangers of the old road, it will be of added scenic value, giving the tourist a grand view of the Mancos Valley backed by the La Plata Range of Mountains.

The roads from Spruce Tree Camp to the different ruins have been widened and in many places regraded.

TRAILS.

By work of the rangers the trails in the park have been kept in good condition. The trail to Spring House and the natural bridge has been worked, and the damage caused by rain and melting snow repaired. A trail from Cliff Palace to Community House has been roughly laid out, but will require a good measure of work yet. New ladders have been made for several places, where the old ones were becoming weak and unsafe.

WILD ANIMALS.

Several small herds of black-tail deer make their home in the park, and these beautiful animals would rapidly increase if the mountain lions could be exterminated. These latter prey upon the deer, and destroy many each season. The cliffs along the north and west boundaries of Mesa Verde furnish secure hiding places for these predatory beasts, and they annually take a heavy toll from the deer family.

Coyotes are numerous, but do little damage, living chiefly on the rabbits, of which there are great numbers. Bobcats are occasionally seen in the timbered portions of the park. Foxes and badgers are found in numbers and in all parts of the park. The park, if fenced and the predatory animals hunted out, would be an ideal game preserve, for it contains both summer and winter range. Buffalo, elk, deer, and mountain sheep would do well here, and when the private lands within the park have been acquired by the Government, hay to feed in bad winter weather could be raised.

CONSTRUCTION WORK.

During the year there has been constructed at Spruce Tree Camp a new ranger cottage of four rooms, at a cost of $993.29. This cottage is situated on the rising ground to the north of the hotel, and overlooks the entire camp and grounds.

A water tower has been built above the hotel. The old tank was placed in the new building, which is built of rough stone and shingle, and is located high enough to give pressure to all parts of the camp. The construction of the building, extension of the pipe line, and the changing the tank from its former location were done at a cost of $493.10.

A high cedar stockade has been constructed to separate the camp from the yard in the rear of the hotel, at a cost of $85.75.

All the old buildings have been moved up the side of the canyon and placed in the rear of the hotel building, behind the stockade fence.

Cedar benches have been made and placed about the camp for the use of the visitors.

The log cabin has been fitted up for a rest room and for the museum. Glass cases for the relics have been placed in one room of the building, where all the collections of curios can be seen by all.

A small ice house has been constructed in the rear of the hotel building.

A large open shed has been constructed for the shelter of cars while in the park.

A large shelf of rock in Cliff Palace, on which was one of the big towers, has been supported by a column of stone to prevent the falling of this tower. One of the kivas in Balcony House has been repaired, where the water from the spring had undermined the walls.

A Delco electric-lighting plant has been installed of sufficient power to light the entire camp. This improvement was badly needed, as lanterns had to be used by visitors to find the tent assigned to them. The plant installed and the camp wired, lamps placed, and the system ready for use cost $750.

RECOMMENDATIONS.

There are many undertakings for the improvement of the park that could be suggested. Indeed, the possibilities are almost limitless, but as these improvements can only be gained by working them out one by one, the more pressing needs will only be mentioned. Ultimately it is hoped that this park will be not alone attractive on account of its archæological wonders, but also be made of interest to the naturalist. Nature has in Mesa Verde provided a rare place for a big game preserve, and it is hoped that some day will see it the home of herds of the big game species of America.

At present the more imperative needs are more roads and more extended restoration work among the hundreds of ruins in the park. A short strip of road across the divide between Morefield and Prater Canyons, some 3 or 4 miles in length, connecting with the present road at Stations 64 and 327, would eliminate some 6 miles of travel for the visitor going to the ruins, do away with the longest grade on the road, and add much to the scenic value of the trip. This road should be made during the coming season.

Other roads are necessary to open up to tourists sections full of interest, containing many rare old ruins that are now inaccessible except to those who are willing to make a hard horseback trip.

A short piece of road should be at once constructed from Station 64, at the head of Morefield Canyon, to the top of Point Lookout. This would be a side trip, and would be taken by all, either on entering the park or on the return. The level space on the very outmost point of the hill would provide ample space for cars to turn, and the view obtained in all directions is unobstructed. Many tourists now leave their cars at Station 64 and walk the short distance to the summit, and no one should leave the park without having seen the view from this point.

One of the immediate needs of the park is the preservation of Square Tower House, a fine example of prehistoric architecture. The square tower, from which the ruin takes its name, will soon fall if not stengthened. Here were found the only kivas with the original coverings, or roofs, in place. This ruin is only 2 miles from the camp and many tourists visit it, although the approach is perilous. It should be restored, protected, and an easy and safe approach provided. On the face of the cliff, near the center of the ruin, is carved the scroll, supposed to be the sign of water. It will be of great interest to learn whether, beneath the fallen rock and the drift of ages, there is a spring of water. Such will probably prove to be the fact, though now there is no sign of moisture on the surface to indicate the presence of living water. High up in a niche in the cliff, overlooking the ruin, is perched a small room with loopholes pointing downward, making it impregnable to foes from below. Altogether this ruin is one of the most interesting in the park and should be preserved. It is now fast falling into hopeless decay and the work of restoration should be taken up at an early date.

Mummy Lake should be excavated and restored, and the old ditch leading into it cleaned out that the water from the summer rains will be saved. At present the reservoir is full of water only early in the spring, but with the water protected it should remain full the greater portion of the season.

GLACIER NATIONAL PARK.

W. W. PAYNE, Superintendent, Belton, Mont.

GENERAL STATEMENT.

The Glacier National Park was established by the act of Congress approved May 11, 1910 (36 Stat., 354), and is located in northwestern Montana. It embraces 1,534 square miles of the Rocky Mountains and adjacent territory, extending north from the main line of the Great Northern Railway to the Canadian border. The eastern boundary is the Blackfeet Indian Reservation, and the western boundary is formed by the Flathead River. The park, which is irregular in shape, has an area of 981,681 acres. Its greatest length in a northwesterly-southeasterly direction is about 60 miles, with a maximum width approaching 40 miles. Within its borders are attractions for the scientist, nature lover, and tourist unsurpassed by any country in the world, tourists of world-wide experience pronouncing it the Switzerland of America.

The elevations in the park range from 3,100 feet to over 10,400 feet. The high central portions of the area in the northwestern-southeastern axis are formed by the Continental Divide, the peaks and cliffs of which are sharper and bolder than found elsewhere in the United States and are in marked contrast with the open plains of the east and the valleys of the Flathead River on the west. Many of the mountain peaks are difficult to climb, one of which—Mount St. Nicholas, "The Matterhorn"—has never been climbed; while Mount Cleveland, the highest mountain in the park, is 10,438 feet in elevation. But the most wonderful of all the mountains is Triple Divide Peak, for from the top of this mountain, and from no other place in North America, one can stand and throw stones into the headwaters of streams flowing northward into the Hudson Bay, into those flowing southward to the Gulf of Mexico, and into those flowing westward into the Pacific Ocean.

Within the confines of the park are 60 or more active glaciers, these ice sheets being the source of beautiful cascades and mountain streams flowing into numerous clear and placid lakes, for which the park is famed. The most noted of these lakes are Lake McDonald, Lake St. Mary, Lake Ellen Wilson, Iceberg Lake, Red Eagle Lake, Kintla Lake, Bowman Lake, Waterton Lake, Quartz Lake, Harrison Lake, Logging Lake, and Two Medicine Lake. Lake McDonald, which is situated at the west entrance, and Lake St. Mary, about 36 miles north of the Glacier Park entrance on the east side of the park, are the two largest and most widely known, and are visited by a large number of tourists each season. They are of easy access and have pleasure launches for the accommodation of visitors. Each lake in the park has a distinct individuality of its own. A special setting of soft, beautifully wooded hills and mountains, or rugged, bold, many-colored cliffs, and towering, serrated peaks with dazzling snowcaps, or perhaps blue-white glaciers, all of which present to the eye of the visitor a picture of unsurpassed beauty that is never forgotten.

The park is governed by a superintendent whose headquarters are maintained at Belton, the western entrance of the park. New administrative buildings were recently constructed on a tract of land purchased by the director, Mr. Stephen T. Mather, and donated to the park for administrative purposes. Here is also maintained an office staff to assist in this part of the park administration and the office of the United States Commissioner, before whom are tried those arrested for violations of park regulations. The police and patrolling of the park is done by a force of 12 rangers under a chief and assistant chief ranger, the chief ranger's headquarters being maintained at Glacier Park Station on the east side of the park and the assistant chief ranger's at Belton. A telephone line connects all ranger stations on the west side with the park headquarters.

TRAVEL.

The regular tourist season was fixed from June 15 to September 15, and while it opened on schedule time and every accommodation was ready for the tourist there was a decided decrease in the number of visitors. However, tourists who visited the park appreciated the preparation that had been made for their accommodation by the various concessioners, the Glacier Park Hotel Co., the Glacier Park Transportation Co., and the Park Saddle Horse Co., as well as the Lake McDonald Transportation Co. and the privately owned Glacier Hotel on Lake McDonald. The total registration of tourists entering the park during the season and the accommodations furnished by the different transportation and hotel companies is summarized as follows:

Registration at Belton entrance:		
Via Glacier Park Transportation Co	629	
Via Weightman's livery service	315	
Via private conveyances (autos, etc.)	2,579	
Entered on foot	123	
		3,646
St. Mary's entrance:		
Via Glacier Park Transportation Co	1,330	
Via private conveyances (autos, etc.)	1,164	
Via horseback	81	
		2,575
Two Medicine entrance:		
Via Glacier Park Transportation Co	321	
Via private conveyances (autos, etc.)	421	
Entered on foot	1	
Entered on horseback	90	
		833
Many Glacier entrance:		
Via private conveyances (autos, etc.)		384
(All other visitors registered at St. Mary's entrance.)		
Belly River entrance:		
Entered via private conveyances, etc		146
Waterton Park entrance:		
Via boat from Waterton Lakes Park, Canada		1,502
Total visitors entering park		9,086
Automobile permits issued:		
Belton entrance	526	
St. Mary's entrance	327	
Two Medicine entrance	100	
Many Glacier entrance	100	
		1,053
Complimentary		12

The various transportation companies in the park report the number of tourists handled during the season as follows:

Glacier Park Transportation Co., total number of fares carried	2,280
Park Saddle Horse Co., total number of scheduled trips	1,172
Park Saddle Horse Co., total number of nonscheduled trips	1,105
Lake McDonald Transportation Co., total number round-trip and one-way fares carried	2,909
Glacier Park Hotel Co., boat on St. Marys Lake	2,685

The various hotels and chalets throughout the park report 35,544 meals and 15,700 lodgings being furnished visitors the past season, as follows:

Hotel or chalet.	Meals.	Lodgings.
Glacier Park Hotel	13,850	4,506
Two Medicine Camp	1,184	326
Cut Bank Camp	296	146
St. Mary Camp	1,426	359
Going-to-the-Sun	5,150	1,243
Many-Glacier Hotel	12,624	4,049
Granite Park Camp	1,014	329
Belton Chalets	(1)	830
Glacier Hotel (Lewis')	(2)	3,912
Total	35,544	15,700

[1] None. [2] No report.

CONCESSIONS.

The Glacier Park Hotel Co. operated all of their hotels and chalets throughout the park during the 1918 season with the exception of Sperry and St. Mary Chalets, which, on account of the need of repairs and the small number of tourists in the park, were not opened. A few, however, were able to get meals at Sperry Chalet while en route from Going-to-the-Sun Camp to Lake McDonald, from the caretaker, who was stationed there a portion of the summer. In addition to their hotels and chalets, the Glacier Park Hotel Co. operates the passenger boats on St. Marys Lake between St. Marys Chalets and Going-to-the-Sun Camp.

All of the automobile transportation in the park is carried on by the Glacier Park Transportation Co., which operates about thirty-one 10-passenger auto busses and several touring cars. The larger cars make daily trips between Glacier Park Station and St. Marys and Many Glacier, as well as Two Medicine and Cut Bank, on the east side of the park, and between Belton and the foot of Lake McDonald, on the west side.

The Park Saddle Horse Co., which has the concession for furnishing saddle and pack horse service in the park, made scheduled trips to the various points of interest throughout the park from the Glacier Park Hotel, Many Glacier Hotel, Going-to-the-Sun Chalets, and the Glacier Hotel, on Lake McDonald, as well as nonscheduled trips for those desiring to make independent camping trips.

The concession for passenger transportation on Lake McDonald was given to Messrs. Miller & Kelly. During the past season the 75-foot gasoline boat *Lewtana* and the 35-foot launch *Emaline* were kept in operation on regular scheduled trips, the travel not justifying the operation of their other two launches.

A permit authorizing the collection of fishing parties for trips on McDonald Creek and the Middle Fork and North Fork of the Flathead River was issued to George E. Snyder, who owns and operates a 75-foot air-propelled launch and a 20-foot air-propelled launch, both especially adaptable for use in shallow water. However, to avoid concessions conflicting, this permit only permits the collection and return of parties from points on Lake McDonald for fishing trips on the aforementioned streams.

A permit was also granted Mr. H. H. Hansen to operate a tourist supply store and camp and to provide sleeping accommodations to tourists at the south end of Lake Waterton; also to operate a passenger boat service on that lake. A small log building was used for the store and several tents were erected for the accommodation of tourists desiring sleeping quarters. In view of the fact that over 1,500 tourists registered at this point during the season it is hoped that better accommodations can be provided to take care of those visiting this part of the park in the future.

A permit for operating a nonscheduled livery business on the west side of the park was granted Mr. John Weightman, who owns a livery barn at Belton. This concession, however, was not for scheduled trips, as the auto busses make the regular scheduled trips between Belton and the foot of Lake McDonald.

ROADS.

There are 130 miles of roads in Glacier National Park and in the Blackfeet Indian Reservation, which borders the park on the east, the construction and maintenance of which is under the supervision of the park superintendent. Of this amount about 95 miles are suitable for automobile travel and the remainder, owing to their unimproved condition, are used only by horse-drawn vehicles. The sundry civil act for 1919 carried an appropriation of $80,000, under which the following road work has been done to date;

Glacier Park–Many Glacier Highway.—From Glacier Park to a point one-half mile south of 9-mile hill holes in the road were filled with gravel, gutters cleaned, and culverts repaired, and the Two Medicine bridge strengthened. From this point north to the bottom of 9-mile hill the road was graded, graveled, and rolled. On the loop, where the Browning Road connects with this highway, the road was graded, graveled, and rolled. In all, about 2½ miles of excellent road was completed. From this point on to 23 miles rakers were employed raking loose rock from the roadway and repairing culverts and bridges. From 23 mile to St. Marys slides were removed and gutters cleaned and some cribbing done.

From 35½ to 39 miles the road was graded, graveled, and rolled. A small amount of work, such as top dressing, still remains to be done here. About 3 miles of the road has been graveled. A small crew has been engaged from here on to Many Glacier repairing the road and bridges. The Swiftcurrent bridge was also redecked during the season.

Two Medicine Road.—Slides and rock were removed from this road and riprapping was done at Trick Falls bridge.

Cut Bank Road.—Slides and rock were removed from this road.

West side—Belton-Fish Creek Road.—The bridge across the Middle Fork of the Flathead River was repaired and strengthened and slides removed from the road between the bridge and the new administration site and the road was dragged when the weather would permit.

North Fork Road.—About 800 feet of new corduroy was completed on this road. Grading and repairing was also done, and the road is now in a condition for automobile travel for a distance of about 20 miles.

Remarks.—On account of the excessively dry season and high winds the roads became very dusty, and as it was impossible to drag them numerous holes developed. However, most of the bad places have been filled with gravel. Even on the newly graveled stretches it was impossible to get a hard, packed road, even with the use of the roller, without the proper amount of moisture. During the latter part of the season, however, there has been more rain and the completed sections are rounding into shape, and in the spring these new stretches should open up in excellent condition.

TRAILS.

Of the 225 miles of trails within the park about 150 miles were maintained during the 1918 season.' The two principal passes, Gunsight and Swiftcurrent, were open when the tourist season opened, on June 15, but about July 1 Gunsight Pass was partially blocked by two slides. The trail was quickly reopened, however, and there was no inconvenience to tourists. The other maintenance work on the trails consisted in removing slides, fallen timber, and rocks and renewing drains, bridges, and corduroy. The new trail construction for the season consisted of the following:

Lake McDonald trail.—That part of this trail left unfinished last fall was completed and the entire trail from the foot of Lake McDonald to the Glacier Hotel cleared of fallen trees, etc. The trail as completed is from 6 to 8 feet wide and follows the old road survey line.

NATIO

Logan Pass trail.—This trail was completed and opened for tourists August 3, the McAdoo party, consisting of Secretary McAdoo, Mrs. McAdoo, Mr. Oscar Price, Mr. Schaffer, and Dr. Frank Miller, passing over the route from Granite Park to Sun Camp on this date. This trail is 16 miles long and is one of the most scenic in the park, opening up for tourist travel Hidden and Twin Lakes and a very interesting unnamed glacier. Flowers in great numbers and varieties abound on the pass during the season.

BUILDINGS.

The buildings of the new administration headquarters at the Belton entrance which were started last fall were completed this summer and are now ready for occupancy. These consist of four residences, each 28 by 28 feet and having a kitchen, living room, sleeping room, and bath, and space for two additional rooms upstairs; frame warehouse, 28 by 36 feet, shingle covered; stable, 36 by 56 feet, and capable of accommodating 14 head of horses; carriage shed and hostler's quarters; and the water plant and sewer system.

The roof of the shelter cabin at Piegan Pass, constructed last season, was blown off during the winter and a crew was employed in laying a new roof.

The temporary warehouse at Glacier Park Station was demolished by a windstorm on the night of February 9. The Great Northern Railway loaned the park the use of their old stable for use as a warehouse until such time as a permanent structure could be constructed. Work was recently started on a building for this purpose on the site of land donated to the park by the Great Northern Railway Co. and the building will be completed and ready for occupancy before the cold weather sets in.

During the summer a fish hatchery was constructed on a plot of ground just back of the Glacier Park Hotel, description and operation of which will be discussed under separate heading.

FISH.

Excellent fishing has been reported during the past summer in nearly all of the lakes and streams in the park in which fish are found. Good fishing is, of course, always to be found in Avalanche Lake and Creek, but during the 1918 season such lakes as Two Medicine, St. Mary's, and McDermott, on the east side of the divide, as well as Bowman, Trout, and Snyder Lakes on the west side, have been reported as furnishing better sport of this kind than in previous years.

Fish hatchery.—The National Park Service, in cooperation with the Bureau of Fisheries, has erected a fish hatchery a short distance west of the Glacier Park Hotel at Glacier Park Station. The building is 49 by 34 feet and 1½ stories high, with shingled roof and rustic siding. It is equipped with 32 troughs 16 feet by 17½ inches, each trough containing 9 compartments which hold 6 loaded trays with one tray on top for binder. The egg capacity is about 5,000,000 during incubation; 2,500,000 fry can be handled. An unlimited water supply is furnished by Midvale Creek, which passes within a short distance of the hatchery.

Species to be hatched.—*Salmo irideus* (rainbow trout), *Salmo mykiss* (black-spotted, native, or cut-throat trout), *Salvelinus fontinalis* (eastern brook trout), *Thymallus tricolor montanus* (Montana grayling), *Salmo gairdneri* (steelhead trout). Of the 300,000 black-spotted trout eggs sent to this station from the Yellowstone Park 275,000 sturdy trout were hatched and the lot are to be planted in the waters of the park.

Fry are to be planted in the following lakes and streams within the park: Lake Josephine, Gunsight Lake, Cutbank River, Lake McDermott, on the east side of the park, and in Lakes McDonald, Logging, Bowman, Quartz, Kintla, and other smaller lakes on both the east and west side of the park; 8,400 brook trout fingerlings have already been planted this season and more are to be made during this month; several thousand rainbow trout are to be planted, the brook and rainbow trout being shipped here from the Bozeman (Mont.) station.

Owing to the fact that the hatchery was not finished before the middle of August it will not be possible to hatch anything more this season. It is very probable that collections of black-spotted eggs will be started next season—June, July, and August. Brook-trout eggs will likewise be collected within the park in the near future, also rainbow, steelhead, and grayling. It is very probable that later on lake trout or Mackinaw trout (*Christivomer namaycush*); whitefish (*Corregonus clupeiformis*) will also be hatched and liberated in the waters of the park. The ground around the hatchery will be parked and no doubt some ponds made for holding adult trout for exhibition purposes. There is no reason why, under the proper system of development, the waters of Glacier National Park should not contain the best fishing on earth. The fry hatched here are wonderfully sturdy and lusty and this indicates that the water is better than the average for fish. This, together with the aquatic life (for fish food) in the lakes and streams, will in time make this park a wonderful mecca for the angler.

WILD ANIMALS.

The protection afforded the many species of wild animals found in the park is beginning to show in their increasing numbers and their tameness. This is especially apparent as regards the Rocky Mountain sheep, goats, and deer. In previous years a good view of a band of sheep or of a goat jumping from one crag to another on the mountain side was a rare sight indeed; but now it is a common thing to see tourists viewing these animals through field glasses from hotel or chalet veranda. Deer are also increasing in numbers and the campaign of extermination that is being inaugurated against the predatory animals in the park will help greatly in removing this menace to the deer. Elk are still plentiful in the southeastern portions of the park. Moose are seldom seen along the trails although it is claimed there are in the neighborhood of 100 in the park. They confine themselves usually to the lake regions on the west side of the park and in the North Fork valley. Bear, both black and cinnamon, are often seen by tourists riding over the trails. Occasionally a grizzly bear is seen, but they are not numerous.

Predatory animals.—During the early part of the summer the park was visited by Mr. Vernon Bailey, chief field naturalist for the Bureau of Biological Survey. Conditions relative to the destruction of game by predatory animals were investigated and considered sufficiently serious to warrant action being taken toward their extermination. A cooperative agreement was reached between the National Park Service and the Biological Survey under which the Biological Survey should train hunters and oversee the work and the National Park Service pay the salaries.

It was originally planned to send four hunters from the Idaho district, these men to devote about two months of the present fall season in systematically clearing the park of predatory animals and later returning to their regular stations. For several reasons it became necessary to abandon this arrangement, the most important of these being increased pressure of the Army draft and the conviction that more permanent and less expensive results could be obtained through securing local men and training them for the work. Experience has shown that no lasting benefit may be had through a brief period of work, however thorough. As the park is surrounded by hundreds of miles of infested territory, and predatory animals are more or less migratory, a small area is quickly restocked when work is relaxed. By the coming spring, the time when deer are killed in the deep snow by coyotes, enough of these would have drifted in to inflict serious losses and little would be gained by the brief period of fall work. Success in this venture will depend on the permanent employment of the required number of hunters and the job will be a question of years, not months.

Mr. L. J. Goldman, of the Biological Survey, arrived at park headquarters on August 22. He spent several days in familiarizing himself with local conditions, perfecting plans, and locating desirable material for hunters. In this work he was assisted by the assistant chief ranger and one ranger, every assistance possible being provided. Mr. Goldman personally covered the country about Lake McDonald and from Belton to Quartz Creek. Descriptions of the country from Quartz Creek to the boundary were sufficient for present purposes. This region is heavily timbered, with occasional burns and small clearings. The east slope of the park was not visited, as conditions there will not warrant placing cooperative hunters at the present time. This district east of the divide and including the adjoining Indian reservation is open in character. One hunter was established on Anaconda Creek, as this is a central point for the area where coyotes are most abundant and trapping most feasible. Another hunter was assigned the territory from Logging Creek to the international boundary. By September 6 the hunters had been thoroughly instructed in the proper methods of hunting and trapping, and the work was turned over to them.

Of the abundance of coyotes and the damage done to game on the west side of the park, it will be well to avoid taking snap judgment. This can only be determined as the work progresses. Some residents report many coyotes and much damage, but nothing can be more unreliable than the average citizen's estimate in such matters. Coyotes are not usually plentiful in heavily-timbered sections, as the animal prefers the open foothills and plains. But throughout the West there is often a scattering of these animals ranging through the timber and even above timber line. For a number of years I have observed their fall migrations, when, with the coming of winter and deep snows, many leave the mountains and drift into low country. Without study, no accurate report can be made on a given locality, and an attempt at such would be worse than worthless. Mr Goldman found coyote sign in a number of places, but would not rate them as abundant. Six were killed in a very short time. He estimates that on the line placed, possibly from 15 to 25 coyotes may be caught during a month.

The coyotes' habit of killing deer and antelope about February and March, when snow is at its greatest depth, is well known. Several places in Idaho reported considerable losses last spring. A comparatively small number of coyotes can inflict a very large amount of damage, and there can be no doubt that there are enough coyotes in Glacier Park to destroy a large amount of game. In carrying on this work, benefit to stock and game interests is not necessarily based on the actual number of predatory animals killed, but in removing the individuals responsible for losses. That there is urgent need of game protection from the various carnivores, I am fully convinced. Rough, timbered sections are difficult to work owing to troubles encountered in attempting to handle long trap lines, which is the secret of success in predatory animal work. But the venture is well worth the cost, even though large kills per month are not made.

Work on the east side of the park is a straight Biological Survey affair. A large part of the territory to be cleared lies within the Blackfeet Indian Reservation, and this work will benefit local stock interests as well as the park. So long as it remains a breeding ground for coyotes, the animals will drift across the divide into the deer yards of the west slope. The game of the east side is not suffering from depredations by coyotes, since deer are not plentiful and mountain sheep and goats are in very little danger. Of other predatory animals there are some lion, a few cats, and, perhaps, some wolves ranging across from the Canadian side.

RANGER SERVICE.

During the year the ranger force consisted of 1 chief ranger, 1 assistant chief ranger, and 12 rangers. Private owners in the park have greatly assisted in the prevention of forest fires and in several cases have extinguished small fires without help from the park forces.

FOREST FIRES.

Although the season has been extremely dry, by constant vigilance on the part of park rangers and the hearty cooperation of the officials of the Flathead, Blackfeet, and Lewis and Clark National Forests no fires of any consequence have occurred within the park. The following is a summary of fires during the 1918 season:

June 12, a small fire started near Highgate, burning over an area of about 50 acres covered by dead-and-down timber. It was completely extinguished in two days.

June 13, a fire started on the forest reserve south of the park and jumped the river in the vicinity of Park Creek. A crew of 10 men drawn from the Forest Reserve extinguished the fire by June 23, the small damage being confined to a small area.

June 19, a fire was started near Highgate by sparks from a Great Northern Railway locomotive. A park ranger, assisted by a small crew, quickly extinguished the fire.

July 8, a small fire reported near Paola was extinguished by a small section crew working under the park ranger in that district. No material damage was done.

July 12, a fire was started by lightning on the west side of Lake McDonald. It was extinguished by a crew under the assistant chief ranger, after burning over about one-half acre.

July 17, a fire was reported on Howe Ridge, west of Lake McDonald, being started by lightning. It was extinguished by July 26 by trail crews after burning over an area of about 40 acres of a fair growth of pine and tamarack timber.

July 18, a small fire one-half mile west of Fielding was extinguished by the park ranger there, working with a section crew. About 1 acre of dead timber was burned over.

July 19, a fire, started by lightning, was reported as on Citadel Peak, near the Canadian boundary. It was extinguished by the park ranger there and crew before any material damage was done.

July 21, a small fire started in sec. 24, T. 33 N., R. 18 W. was extinguished by the assistant chief ranger while on patrol. No damage was done.

ACCIDENTS.

Due to the careful handling of the tourists, there were no serious accidents in the park during the entire tourist season.

RECOMMENDATIONS.

The old wooden bridge across the Middle Fork of the Flathead River at the Belton entrance is no longer safe, and a new short-span steel bridge should be erected at or near the old bridge site. At the same time the road from the bridge to the new headquarters should be raised so that it will not be flooded during the high-water periods.

With the increase in traffic on the west side of the park the need is becoming urgent for the improvement of the North Fork Road. Only a comparatively small portion of this road, which reaches to the Canadian boundary, is suitable for automobile travel. This road should be improved by grading and draining.

Very little work has been done in the past on the upkeep of the trail system already constructed in the park. Adequate provision should be made for the maintenance of the trails as well as roads, that have already been constructed. No construction work other than the foregoing is recommended on account of the small appropriation expected.

In conclusion I desire to express my hearty appreciation to the entire working force for their loyalty, to the private owners for their strict observance of the park regulations, and to the concessioners for their cooperation in the entertainment of the tourists.

ROCKY MOUNTAIN NATIONAL PARK.

L. C. Way, Superintendent, Estes Park, Colo.

GENERAL STATEMENT.

The Rocky Mountain National Park was created by the act of January 26, 1915 (38 Stat., 798). Under the act approved February 14, 1917 (39 Stat., 916), entitled "An act to add certain lands to the Rocky Mountain National Park, Colorado," approximately 48 square miles have been added, making the present area of the park approximately 400 square miles. The above acts provide that not more than $10,000 shall be expended for administration, protection, and improvement in any one year without special act of Congress. Exclusive jurisdiction over the above area has not yet been ceded to the Federal Government by the State of Colorado.

TRAVEL.

An absolute check on the number of people entering this park can not be had under the present conditions. There are no entrance gates and no official checkers to ascertain the number of people or where they came from. This is a disadvantage from the standpoint of the visitors, as well as from that of the park, for with official entrance gates and checkers park officers would be in a position to give needed information to the visitors which would add to their pleasure, as well as information on traffic and other regulations necessary for the safety and protection of all.

Travel was exceptionally heavy to about June 15 this year, at which time a cold rain swept the country, with heavy rains almost daily, and travel fell off greatly, increasing again after August 1 and continuing through August and into September. The following tabulation shows the actual count.

Travel by States in the Rocky Mountain National Park, season of 1918, Estes Park and Longs Peak entrances.[1]

State.	Autos.	Passengers.	State.	Autos.	Passengers.
Alabama	1	2	Nebraska	1,239	5,319
Arkansas	17	85	Nevada	2	7
Arizona	11	40	New Jersey	2	7
California	37	171	New Mexico	11	44
Colorado	8,310	34,335	New York	12	50
Connecticut	1	5	North Carolina	2	9
District of Columbia	2	7	North Dakota	1	11
Delaware	1	1	Ohio	14	56
Florida	3	19	Oklahoma	247	1,128
Georgia	3	17	Oregon	3	12
Idaho	2	9	Pennsylvania	5	68
Illinois	84	498	Rhode Island	1	1
Indiana	20	89	South Dakota	9	41
Iowa	179	834	Tennessee	1	12
Kansas	538	2,299	Texas	141	615
Kentucky	2	8	Utah	5	20
Louisiana	9	47	Virginia	1	4
Maine	1	1	Vermont	3	14
Maryland	1	2	Washington	1	1
Massachusetts	1	26	West Virginia	1	3
Michigan	15	70	Wisconsin	2	20
Minnesota	7	35	Wyoming	190	784
Mississippi	4	25			
Missouri	231	1,137	Totals	11,377	47,943
Montana	4	15			

[1] The above figures are actual count; no estimate given of visitors missed by checkers. They were obtained by having men stationed at entrances, who counted the number of people in each automobile or other vehicle as they passed, the classification as to States being determined by the license number on the machine. It can be readily seen that many persons from other States than Colorado would hire machines in Denver or other points for a trip to the park, yet they must, under this system, be recorded as Colorado people. Again, all evening travel could not be counted. Checkers were employed by the Denver Civic Association from June 15 to Sept. 15, the count prior to and after those dates being obtained from hotel registers. From calculations made at different times after checking hours it is estimated that we failed to record more than 20 per cent of the people entering the national park at these entrances.

Travel not classified by States.

	Autos.	Passengers.
Transportation companies:		
Rocky Mountain Park Transportation Co.		3,156
Denver Herdic Transportation Co.		1,328
Boulder Transportation Co.		16
Total		4,500
Estimated:		
Estes Park entrance, missed by checkers	3,211	16,064
Grand Lake entrance	6,000	30,000
Wild Basin region, on foot or horseback		2,400
Mummy Pass region, on foot or horseback		600
Totals	9,211	49,064
RECAPITULATION.		
Private transportation	11,377	47,943
Transportation companies		4,500
Estimated	9,211	49,064
Grand totals	20,588	101,487

Visitors from the following foreign countries were registered in the park this season: Australia, 2; Belgium, 1; Canada, 13; China, 1; Dutch East Indies, 2; England, 2; Egypt, 3; France, 1; Hawaii, 3; India, 2; Japan, 4; Mesopotamia, 1; Mexico, 5; Persia, 1; Russia, 1; Turkey, 1; total, 43 visitors.

The increase in camping parties this year is very apparent, 90 per cent being made up of entire families who remained from one to four weeks. Travel generally, however, was not so heavy as last year.

ROADS.

County roads within the national park and approaches thereto were greatly improved this year over last, county and State officials having charge of the work. The county and State roads within the park have not yet been turned over to the Federal Government, and until such action is taken by the State authorities the National Park Service can not spend money for improvements or other purposes.

Big Thompson approach.—This approach road was widened and greatly improved in other respects this year, but should be further widened for traffic in both directions the entire distance from Loveland and Fort Collins to Estes Park entrance to adequately handle the hundreds of automobiles using this entrance each season. Considerable resurfacing has also been done and drags used to good advantage, resulting in a smooth, hard road.

Longmont-Lyons approach.—This highway was greatly improved, the entire distance from Longmont to the Estes Park entrance, improvements showing to best advantage from Lyons, where the road enters the foothills. The road has been resurfaced and widened, thus adding greatly to the pleasure and safety of passengers. Where in the past there were several very dangerous places this year's work has eliminated them, and now careful driving insures safety the entire length of the road. This road is less scenic than the other two approaches on the eastern slope, but is extensively used, due to shortening of distance to Denver, the bulk of mail and freight for the national park and the village of Estes Park coming in over this approach, which carries practically all of the winter travel. This road should be widened to permit passing of machines throughout its entire length.

South St. Vrain approach.—This road offers a choice of routes to Lyons, thence to Denver via Boulder or Longmont; also to Ward, thence to Denver via Boulder over the Switzerland Trail route. This route is gaining in popularity, and travel will soon equal that of the older established routes, due to many interesting features, as yet little known, and the amount of improvement work done each year by Boulder County insuring a safe and comfortable passage, regardless of ordinary weather conditions. At the present date it is considered the best road to the national park.

Granby approach.—This road could be improved greatly by changing the present road to follow along and within the west boundary line of the national park, paralleling Grand River, and connecting with the Granby Road at a point southerly from the south boundary of the national park. This would not only shorten the distance between Granby and the Grand Lake entrance, but would add to its scenic value and give a better roadbed. Very little work has been done on the present road, which during rainy seasons has been almost impassable, this being especially true during the spring and fall.

General information on approaches.—The Big Thompson and St. Vrain Roads are equally attractive from a scenic standpoint, the former following the Big Thompson River, which flows between perpendicular walls from 100 to 500 feet in height, from the foothills to Estes Park, while the topography along the St. Vrain route changes from high, rolling country with distant views to valleys and deep canyons. People should enter by way of one route and leave by way of the other to get the best results from a trip to the national park. The chief inducement to traveling the Lyons route is the shortening of the distance between Estes Park and Denver. While this route has great scenic value, it is not comparable to the Big Thompson or the St. Vrain routes. All three of the above roads suffered greatly from cloud-bursts this past season, hitherto almost unknown in this section. Prompt response by the Rocky Mountain Parks Transportation Co. and the county officials with men and teams prevented any tie-up and traffic was delayed but a few hours in each case.

County and State roads within the national park.—County and State roads within the park are in better condition this year than ever before. Moraine Park, High Drive, and part of Longs Peak roads have been graded and rocks removed. Spring weather conditions were very favorable for this work, and frequent rains during July kept the wearing off of the surface down to the minimum. So far as I know, there has been no complaint of the condition of these roads this season, with the exception of approximately 5 miles of the unworked portion of the Longs Peak Road, which has been and is now in very bad condition, though at no time impassable. No work has been done on the Fall River Road, between Estes Park village and Estes Park, yet this season is in fairly good condition.

Work on the Fall River Road above Horseshoe Park has progressed rapidly, in comparison with the amount of construction work done the past two years, in which time no additional mileage was opened to the public and very little rock work done. This year, due to the work being placed under the supervision of the Rocky Mountain Parks Transportation Co., the completed portion has been extended a little over a mile above the road end of this spring, and four to six weeks' work will complete the road to Chapin Creek Pass. Work on the western slope has also made rapid progress this year, and two or three weeks' work should carry the completed roadway to Poudre Lakes, leaving from 4 to 7 miles (depending upon which route is accepted) upon which no work has been done to connect up eastern with western ends.

The importance of this road to the traveler, the national park, and the State of Colorado can not be overestimated, completing as it will, connections between Estes Park and Grand Lake, over the Continental Divide, making possible a circle trip to and from Denver which for scenic beauty will not be surpassed in the world. It will be possible to complete the trip in three days' traveling time.

National park roads.—One mile of road has been constructed, connecting the Mill Creek Road and the old Glacier Basin Road, providing a safe and easy road to the free public camping grounds in Glacier Basin. The right of way was cleared and all brush burned in the fall of 1917 and grading completed in time to open the road to the public July 4, 1918. This road also shortens the distance to Sprague's Hotel, Bear Lake, Loch Vale, and the Glacier Gorge country and cuts out the steep grades on the old road, now closed, through the Y. M. C. A. grounds. The road from the camping grounds to the terminal has been crowned and dragged and raised 1½ feet over a beaver dam and placed in first-class condition from Mill Creek Road to its terminus. This road was reported as Bear Lake-Sprague Road in last year's report, now changed to Glacier Basin Road, by which name it will be known hereafter, and described as follows:

Leaving the Mill Creek Road at the junction of Mill and Glacier Creeks, the road crosses Mill Creek and extends southwesterly along Glacier Creek, through Glacier Basin a distance of 3½ miles.

One thousand one hundred and nine dollars have been raised by private subscription and expended on this road to date.

The Beaver Creek Road begins at a point on the east line of sec. 24 T. 5 N., R. 74 W., sixth principal meridian, and extends thence northwesterly a distance of 1½ miles, to a point in section 14, same township and range. This road is used only as a logging road for the removal of burned timber and by fishermen and is in bad condition.

The Mill Creek Road begins at a point in sec. 6, T. 4 N., R. 73 N., west sixth principal meridian, and extends thence westerly to Mill Creek Ranger Station; total length, 1½ miles. The road is now in such condition that it can not be used for vehicles, but is extensively used by parties going over Flattop trail to Grand Lake and for side trips from said trail. Timber and wood from old burns are hauled over this road by using the two front wheels of the wagon and dragging one end of the load. This road should be placed in first-class condition, and if this is done it will be extensively used to get out dead timber and wood.

TRAILS.

Furnishing as they do the only means of access to the principal points of beauty and interest, it is regrettable that, due to the small amount of money available for this national park, we are unable to make permanent improvements of trails, but must confine our work to the most necessary spring repair work, clearing out fallen timber, and corduroying bog holes. Work of this nature has been done on the following trails this fiscal year. Total amount available for this purpose, $498.

Name of trail.	Miles.	Points connected.
Flattop	18	Mill Creek road and Grand Lake.
Hallett Glacier	6½	Fall River road, Lawn Lake, and Hallett Glacier.
Ypsilon	2½	Hallett Glacier trail and Ypsilon Lake.
Storm Pass	4½	Glacier Basin and Longs Peak Inn.
Wind River	2½	Long's Peak road and Wind River road.
Bear Lake No. 1	1½	Glacier Basin road and Bear Lake.
Bear Lake No. 2	1¾	Bear Lake and Bierstadt Lake.
Loch Vale	2½	Bear Lake trail and Loch Vale.
Fern Lake	5½	Moraine Park road and Fern Lake.
Steep Mountain	2	Pool and Mill Creek Ranger Station.
Odessa Lake	1¼	Fern Lake and Odessa Lake.
Deer Mountain	2	Fall River road and Deer Mountain.
Bierstadt Lake	1	Glacier Basin road and Bierstadt Lake.
Milner Pass	15	Fall River road and Grand River road.
Longs Peak	9	Longs Peak Inn and summit Longs Peak.
Total	75	

Bridges.

Name of bridge.	Length.	Width.	Nature of work.
Big Thompson	30	12	Floor replaced.
Mill Creek No. 1	16	12	Floor and stringers replaced.
Mill Creek No. 2	16	9	Floor replaced.
Mill Creek No. 3	30	12	Do.
Fall River No. 1	28	18	Concrete abutments.
Glacier Creek	20	6	New construction.

CONCESSIONS.

No concessions have yet been granted in the Rocky Mountain National Park. There are 4 different companies operating automobiles, and 12 different saddle-horse outfits operating in this park this season, not under Government permit, the official status of these individuals and companies being the same as that of private parties entering the park for pleasure and not for profit.

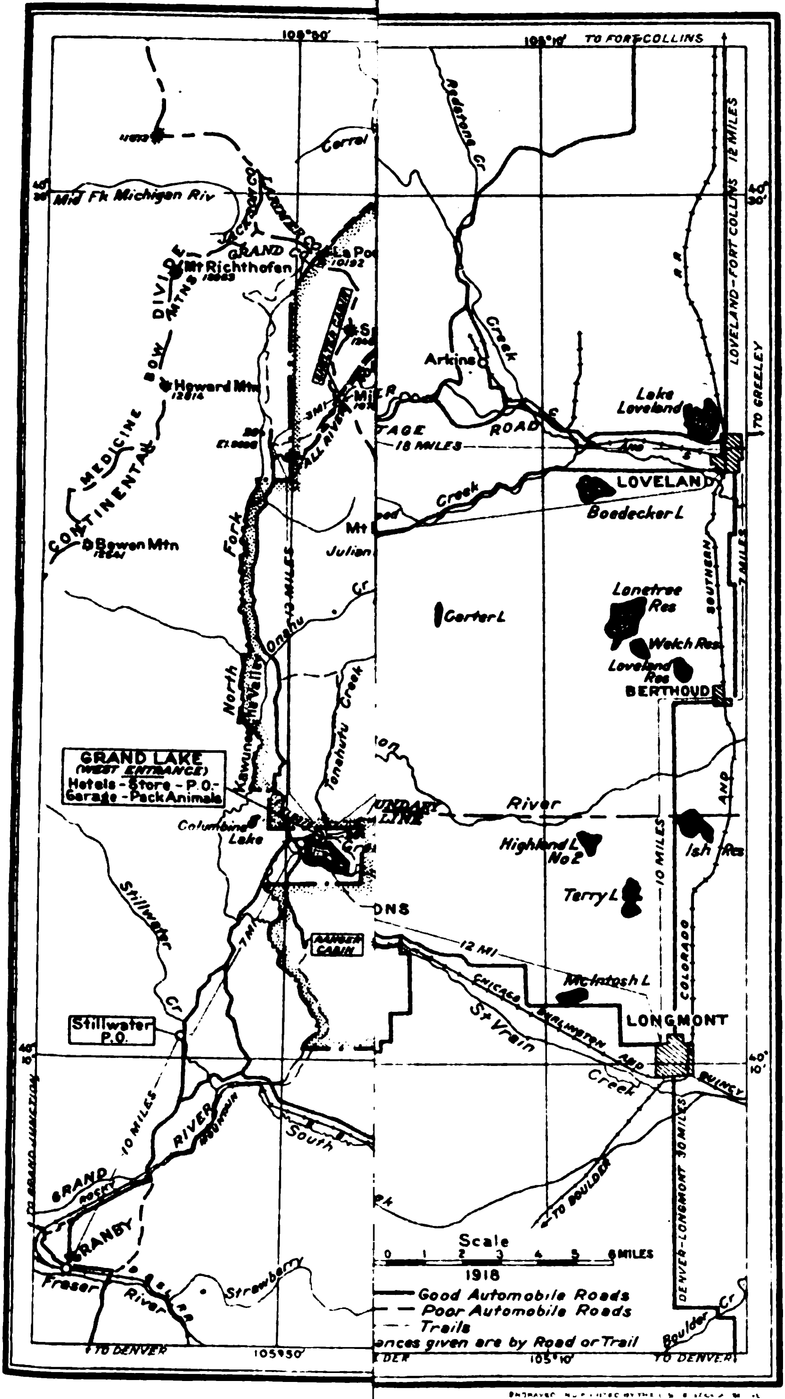
Permits to operate hotels, lodges, and camps have been issued as follows:

Name.	Proprietor.	Capacity.	Location.
Sprague's Hotel	A. E. Sprague	80	Glacier Basin.
Lodges:			
Forest Inn	F. D. Tecker	80	Pool.
Fern Lodge	F. W. Byerly	50	Fern Lake.
Bear Lake Lodge	A. E. Brown	50	Bear Lake.
Camps:			
Timberline	E. A. Mills	10	Longs Peak.
Lawn Lake	Bradley & Patrick	15	Lawn Lake.

All other hotels within the boundaries of the national park, of which there are nine, are located on private property, and are not under the jurisdiction of the National Park Service except in so far as its police regulations apply to this property.

NATIONAL PARK SERVICE

SECOND ANNUAL REPORT PLATE XXVIII



CONSTRUCTION OF BUILDINGS.

Superintendent's residence.—Main building, 24 by 30 feet, gable roof, frame construction; 2 bedrooms, 10 by 12 feet, 8-foot walls; 1 bathroom, 6 by 10 feet, 8-foot walls. Addition, kitchen, 10 by 12 feet, 8-foot walls, sloping roof. Addition, root cellar, 8 by 10 feet, 8-foot walls, gable roof.

Fire tool house.—Single room, 8 by 12 feet, 6-foot walls, gable roof, log construction. Location, Grand Lake. Complete equipment for 25 men, including fire tools and camp kit.

Water-system construction—Superintendent's residence.—Water obtained from spring above house, connecting lavatory, shower bath, closet, sink, hot-water tank, and cesspool.

Pasture-fence construction.—Eighty rods woven wire, 20 rods barbed wire.

Repairs, buildings.

Name.	Construction	Nature.
Mill Creek ranger station	Log	Rechinking, roof repair, windows and doors screened, and minor repairs.
Pole Creek ranger station	...do	Rechinking and minor repairs to house, barn, and outbuildings.
Flattop shelter cabin	...do	General spring repairs.
Fall River shelter cabin	...do	Do.
Poudre Lakes shelter cabin	...do	Do.

CONSTRUCTION, TELEPHONE LINES.

Two miles of metallic-circuit telephone line were constructed, connecting the superintendent's residence with the Mountain States Telephone & Telegraph Co.'s exchange, in Estes Park Village.

Maintenance and repair, telephone lines.—Maintenance and repair of telephone lines has required a great deal of work this year, due to high winds, falling trees across lines during winter months, snow and sleet storms, electric storms during summer months, and some lines being improperly located when taken over by us. This latter fault is being rectified as rapidly as possible by ranger labor, but work necessarily progresses slowly, due to small amount of money available. Work accomplished this year as follows:

Allens Park line.—Rebuilt and placed in first-class condition from Estes Park to Allens Park, a distance of approximately 16 miles. Section from Estes Park to Longs Peak Inn changed to metallic circuit; work done in cooperation with the Mountain States Telephone & Telegraph Co., who have two leads strung on our poles. At Longs Peak Inn connection is made to grounded circuit (by repeating coil) to Allens Park, a distance of approximately 7 miles. This section has, in the past, been practically unusable; it is now giving good service and is dependable.

Mill Creek line.—Connecting Mill Creek ranger station with Estes Park exchange. Has been rebuilt, giving exclusive Government line, cutting out seven private connections. This circuit is metallic, No. 12 galvanized wire being used; distance, 7½ miles, approximately 2 miles tree line, balance pole construction.

Flattop line.—Connecting Mill Creek ranger station with Grand Lake. Necessary spring repairs. Line raised at several places to escape snow; total distance line raised, 6 miles. This line necessarily passes through old burns, which causes great trouble from falling trees, and right of way of sufficient width will have to be cleared to eliminate this trouble. This line is extensively used from Grand Lake and Flattop shelter cabin (where phone has been installed) for administration purposes and by business men at Grand Lake and tourists, who use this line through Estes Park exchange for long-distance calls, in preference to toll line out of Grand Lake. This line crosses the Continental Divide at an elevation of 12,500 feet, with a total mileage of 18 miles.

Fall River line.—Connecting end of Fall River road with Estes Park exchange, additional connection being at 9-mile post along road to provide communication in case of accident and for administration purposes. This line has been rebuilt, cutting out sharp bends, and many new poles set, putting line in good condition to 12-mile post; total mileage of line, 14. This line will be extended to Grand Lake via Milner Pass upon the completion of the Fall River road, with telephone installed every 5 miles.

CAMPING GROUNDS.

Camping grounds have been established in Glacier Basin, sufficient ground having been cleared to provide for 100 camps. Ten cement camp-fire stoves have been installed, four garbage pits dug, two sanitary comfort stations installed, and wood provided. Eighty-three camps have been counted on this ground in one day.

WILD ANIMALS.

According to old-time residents of this section, elk, deer, mountain sheep, bear, beaver, and other small animals have not been so plentiful in 20 years in the country within the national park boundaries. Certainly, they have increased rapidly within the past three years, and, being unmolested, they show little or no fear of human beings. In one hour's drive along the High Drive road, on Deer Mountain, 83 deer, 41 mountain sheep, and 27 elk were counted. Since this section is fairly heavily wooded, it is safe to say that not over 50 per cent of the animals in the section at the time were seen. At Sheep Lake we keep salt out for the sheep, and this is the first summer that they have stayed in lowland. They have become wonderfully tame, and bands of from 15 to as high as 57 have been counted almost daily at the salt lick. One band of 56, containing 17 lambs, showed no fear of automobiles nor of persons on foot. The band was almost surrounded by automobiles, and 20 persons were counted on foot with kodaks. The frolicking lambs are especially interesting to travelers and convince the great majority of them that the kodak furnishes more real and lasting pleasure in game hunting than the gun. It is regrettable that Colorado has passed a law permitting the killing of deer this season, for while hunting or the carrying of firearms is not permitted within the national park, much of our game strays outside the park boundaries, and if not killed will again learn to fear human beings, and we will lose the confidence of the wild creatures that we have gained within the past few years. It is gratifying, however, that local people, almost to a person, will prohibit hunting on land owned by them within and adjacent to the national park, and will cooperate with us in preventing hunting. No census has been taken to determine the number of large game animals within the national park, the extent of our work in this direction being to locate summer and winter ranges. These data, as rapidly as gathered, are recorded on a game and fish map in this office, which proves to be instructive and interesting to visitors.

Elk.—Are native to this section, but were exterminated by hunters years ago. A herd, shipped in from Yellowstone, formed the nucleus of our present herds, which now number five. Two of the herds winter in the valleys of the park, near Estes Park Village, and can be seen daily, one near the fish hatchery numbering 17, the other to the east of Deer Mountain numbering 27. The three remaining herds winter from 6 to 15 miles from the village, taking to the high altitudes about June 15. There are perhaps 60 head, all told, in the best condition, and increasing rapidly. Since normally there is very little snow in the foothills, and feed is abundant, it has not been necessary to feed.

Mountain sheep.—Are so numerous that I feel like saying that we have the largest band in the United States. Bands of from 50 to 75 are common along the valley roads during the winter and as late as July 1, when the greater part go to higher altitudes. Bands of from 7 to 50 can be approached to within 50 feet during July, August, and September, especially at Sheep Lake, in Horseshoe Park, and hundreds of pictures of mountain sheep have been secured there this season, and a wonderful opportunity afforded to study these interesting animals in their native haunts. The real thrills, however, come from a trip into the heart of the mountains, where one can see the sheep among the wild, rough country, jumping from crag to crag. The record of increase shows 80 per cent this season, and, with few exceptions, rams, ewes, and lambs are in first-class condition.

Deer.—This beautiful and graceful animal is now more plentiful in the park than any other animal. Large herds, numbering from 10 to 100, are commonly seen during the winter and early spring, and as late as June 15, when the herds break up and go to higher altitudes within the park, where they are seen daily by parties traveling over the trails, usually in herds of from 2 to 6, and are occasionally seen along the valley roads. They are more shy than the mountain sheep, due no doubt to the fact that they have not been protected for so long a period. Judging from an occasional encounter with them, I feel that within a few years, with adequate protection, they will be seen daily, in large herds, along the valley roads, as well as in the wilder country. It has not been possible to get an accurate estimate of the increase, but judging from the number of fawns seen, the increase must have been large. There have been no reports this year of deer in anything but first-class condition.

Beaver.—Colonies are very numerous, and on the increase, in the national park. Their workings line the streams and can be seen in many places within 20 feet of the road, affording a wonderful opportunity to study these interesting animals. In several cases of colonies on private lands they are so numerous that owners have found it necessary to secure permits from State officials to trap them, to prevent destruction of land, by flooding, and destruction of aspen groves. Trapping on national-park lands is not permitted, and very little damage is done to park lands by beaver. Since they are not molested on park lands, it is now possible in certain localities to see beaver working in daylight; also to secure pictures.

Bear.—While native in this section, are seldom seen. Three silver tips, two brown, and five black bears have been reported this year, to one silver tip, one brown with cub, and three black reported last year, within the national park.

Predatory animals.—Three mountain lions have been reported this year. No game animals are known to have been killed, except one mountain sheep. The following predatory animals have been killed by park officers: Fox, 9; bobcat, 2; coyote, 3; marten, 16.

BIRDS, FLOWERS, SHRUBS, AND TREES.

Because of the steadily increasing interest in nature study displayed by adults and children in the park, lists of the birds and plants have been prepared to enable the layman to identify them at sight. The data have been gathered by Park Ranger Dean Babcock. The bird list is based on his recorded observations of the last 10 years, mainly on the eastern slope of the range, but occasionally on the western slopes, and is believed to be quite accurate and complete. It must be borne in mind, however, that conditions of bird life are continually changing. New species are appearing in this region, and old ones in some cases are extending their range. Scientific names have purposely been omitted.

The list of plants is based on explorations and collections made in various sections of the park in August, 1918. This collection will be on file in the park office for reference and use by the public. It has not been possible nor, indeed, desirable to identify especially all the plants collected or observed, and no doubt many species, and even genera, will be added upon further study in the field, and the working out of some of the large and complex groups. However, the list as it stands should give a good general idea of the flora of the park. The separation of shrubs from herbs and trees is somewhat arbitrary, but was made for convenience and interest. This work will be extended to cover the entire year, the ultimate goal being a complete list, together with mounted specimens. These lists will be found at the end of this report.

RANGER FORCE.

The ranger force is entirely inadequate. It is impossible for three rangers to satisfactorily patrol the 400 square miles of territory embraced in this park, composing, as it does, some of the wildest, roughest country in the United States. They can not even adequately protect the park from fires resulting from natural causes. Add to this the hundreds of campers in the wild sections of the park, many of them careless with their camp fires, and the situation is appalling. For police protection alone there should be at least seven permanent rangers throughout the year and five temporary rangers from May 15 to October 1 to protect from accidents the thousands of people using this park, by regulating the speed limit of automobiles, protection of streams, protection of game fish, and general field-administration work. Three rangers have been called in the draft, making it necessary to appoint inexperienced men in their places.

FISH.

Fishing conditions during July and August, 1916, were normal, good catches being the rule. Spring and early summer fishing, 1917, not good, due to abnormal rains, causing high water in streams and lakes. Through cooperation with the Colorado State hatcheries, in the national park, the following streams were stocked:

Name.	Number.	Species.
Cabin Creek	20,000	Eastern brook trout.
Cow Creek	50,000	Black-spotted trout.
Fall River	250,000	Do.
Glacier Creek	50,000	Eastern brook trout.
Mill Creek	100,000	Black-spotted trout.
	50,000	Eastern brook trout.
Big Thompson	100,000	Black-spotted trout.
	50,000	Eastern brook trout.
Wind River	20,000	Black-spotted trout.
East Inlet	150,000	Do.
North Inlet	250,000	Do.
Grand River	250,000	Do.
Poudre Lakes	10,000	Eastern brook trout.
Total	1,350,000	

Plans are being perfected to establish breeding ponds along streams and lakes within the park, this method being necessary to get the best results from the planting of fry, the loss under the present method being so great that it is impossible to raise enough fish to supply the demands of the thousands of travelers within the national park who enjoy the sport of trout fishing. Fish fries held in the open are very popular, those given by Howard James, of the Elkhorn Lodge, being particularly famous. Several guests from the hotels pool their catches, invite from 50 to 100 friends and acquaintances, and have their picnics in the shade of pines or aspens along one of the many streams within the boundaries of the national park.

FOREST FIRES.

Forest fires are an ever-increasing menace to national-park lands. About 10 per cent of fires this summer were caused by lightning, the rest by careless campers. The ranger force has answered to 11 fire calls this year. We received the heartiest cooperation from the Rocky Mountain Parks Transportation Co. This cooperation, in men and machines, has prevented disastrous fires, the largest area burned by any one fire being 7 acres, others not exceeding 400 square feet.

WINTER SPORTS.

Due largely to war conditions, the winter-sports carnival was not as largely attended this year as last, but was a great success, nevertheless. Over 40 members of the Colorado Mountain Club came up in February, bringing many friends. They found many improvements over last year, far more comfortable quarters, and ski and toboggan runs greatly improved. Three minor accidents occurred, none of them serious enough to dampen the ardor of the crowd. All were enthusiastic, and left with the determination to return next February with a larger crowd.

ACCIDENTS.

No accidents of a serious nature occurred within the boundaries of the park this year. Numerous collisions occurred between automobiles and automobiles and saddle horses, none of which resulted in more than slight damage.

BIRDS OF THE ROCKY MOUNTAIN NATIONAL PARK.

WATER BIRDS.

Pied-billed grebe.—Transient; occasionally seen on ponds in the spring.

Mallard.—A regular migrant, and reported as an occasional resident on Spragues Lakes.

Green-winged teal.—Occurs with the preceding species.

Blue-winged teal.—Reported as occurring with the two preceding.

Sora.—Rare summer resident in montane marshes.

Wilson's snipe.—Summer resident, May to August, in open marshes, 9,000 feet and lower.

Spotted sandpiper.—Summer resident, breeding on lakes and beaver ponds up to 9,500 feet.

Killdeer.—A common spring migrant (April); occasionally a summer resident; in marshes at middle and lower altitudes.

LAND BIRDS.

Quail family, 1 species.

Bob white.—Occasionally reported during the last few years by reliable observers; is probably a rare resident at lower altitudes.

Grouse family, 2 species.

Dusky grouse.—Permanent resident of the subalpine forests and frequently seen in late summer in open glades down to 9,000 feet.

White-tailed ptarmigan.—Common in summer in the alpine meadows, breeding up to 12,000 feet; in winter, at timber line or irregularly down to the montane parks, 9,000 feet.

Pheasant family, 1 species.

Chinese ring-neck.—An introduced species, which seems to be getting established at the eastern edge of the park, at 7,000 feet; once seen at 9,000 feet.

Pigeon family, 2 species.

Band-tailed pigeon.—Summer resident or visitant; not common and rather irregular; occurs mostly below 8,000 feet, in open woods.

Mourning dove.—Summer resident; often around barns and ranches; common at the lower altitudes; occasionally up to 9,000 feet.

Hawk family, 12 species.

Marsh hawk.—Transient; common in autumn (about Aug. 15 to Sept. 15); usually seen flying low over wet meadows; occasionally along high ridges, at timber line, or above.

Sharp-shinned hawk.—Rare transient visitant in autumn.

Cooper's hawk.—Rare summer resident, breeding in the subalpine woods and perhaps lower.

Goshawk.—Autumn and winter visitant and sometimes a rare winter resident (October to March).

Western red-tailed hawk.—Summer resident, at lower and middle altitudes, May to October; the commonest of the large soaring hawks; occasionally wandering to timber line and above.

Swainson's hawk.—Apparently only a rare summer visitant.

Rough-legged hawk.—Winter visitant; infrequent.

Ferruginous rough-leg (*squirrel hawk*).—Summer resident, at low altitudes; not common.

Golden eagle.—This magnificent bird, though not common, is still frequently seen among the high peaks of the ranges, above timber line, where it is a permanent resident. It seems to be increasing in numbers; at least, is becoming less wary.

Bald eagle.—Once observed in late autumn; a very rare migrant.

Prairie falcon.—Known only as an infrequent summer visitant; possibly a rare summer resident.

Sparrow hawk.—Summer resident, April to September, in open woods and fields throughout the park; nests up to 9,500–10,000 feet; the commonest small hawk.

Owl family, 3 species.

Saw-whet owl.—Resident; probably permanent; not common.

Screech owl.—Frequently heard in the evening.

Western horned owl.—Rare but regular permanent resident.

Kingfisher family, 1 species.

Belted kingfisher.—Along streams; in summer, irregularly up to 8,000–9,000 feet; in winter, rarely within the park, migrating to lower altitudes.

Woodpecker family, 8 species.

Rocky Mountain hairy woodpecker.—Permanent resident, in open coniferous forests, most frequently in the montane zone.

Batchelder's woodpecker.—Rare permanent resident; breeding chiefly below 8,000 feet, but occasionally wandering to higher altitudes in winter; the Rocky Mountain "downy woodpecker."

Alpine three-toed woodpecker.—Rare permanent resident, in the subalpine forests; observed as yet only on the western slope of the range, but probably occurs on the eastern slope also.

Red-naped sapsucker.—Summer resident; common and conspicuous; nesting chiefly in aspen groves up to 9,500 feet.

Williamson's sapsucker.—Summer resident, at lower altitudes; rarely up to 9,000 feet, in open woods.

Red-headed woodpecker.—Summer resident, at the lower edge of the park; not common.

Lewis's woodpecker.—Resident in the foothill zone; an infrequent visitant, or rare summer resident, in the park, below 8,000 feet.

Red-shafted flicker.—The commonest woodpecker in the park, from May to September; occasionally seen in winter at the lowest altitudes.

Goatsucker family, 2 species.

Poor-will.—Occasionally reported as a rare summer resident at 7,500 feet.

Western nighthawk.—Summer resident, June to August; common almost everywhere; breeding up to 10,000 feet; very conspicuous in flight.

Humming-bird family, 1 species.

Broad-tailed humming bird.—Summer resident; common and widely distributed, from June to early August.

Flycatcher family, 6 species.

Kingbird.—Summer resident, below 8,000 feet; not common.

Arkansas kingbird.—Summer visitant; observed several times recently; may occasionally breed at the lower altitudes.

Olive-sided flycatcher.—Summer resident, June to August, in the forest region; nowhere common, but generally distributed up to timberline.

Western wood pewee.—Common summer resident in the yellow-pine zone, but rare above 8,500 feet.

Western flycatcher.—Summer resident at the lower altitudes.

Wright's flycatcher.—Summer resident at the middle altitudes.

Lark family, 1 species.

Desert horned lark.—Noted as yet only as an occasional winter visitant at the eastern edge of the park.

Crow family, 7 species.

Magpie.—Permanent resident; common, but rather erratic; up to 8,500 or 9,000 feet.

Long-crested jay (blue jay).—Resident; common and conspicuous at all seasons throughout the park, at middle and lower altitudes.

Rocky Mountain jay (camp bird).—Resident in the coniferous forests; 9,000 to 11,000 feet; a common and familiar bird; very tame and frequently seen around camps and houses within its range both winter and summer.

Raven.—A rare and infrequent visitant; only two records.

Western crow.—Rare and irregular visitant, spring or autumn.

Clark's nutcracker.—Permanent resident throughout the park, chiefly in limber-pine forests; irregular; sometimes quite common.

Pinon jay.—Reported by reliable observers as an infrequent visitant in winter or spring.

Blackbird family, 3 species.

Red-winged blackbird.—Summer resident, March to early August, in marshes, up to 9,000 feet.

Western meadow lark.—Common summer resident, on meadows, below 8,000 feet.

Brewer's blackbird.—Summer resident; common around barns and ranches up to 9,000 feet.

Finch family, 21 species.

Rocky Mountain pine grosbeak.—Resident in the high forests; breeds in the subalpine spruce region (Wild Basin and elsewhere); in autumn and winter, irregularly, down to the montane parks.

Cassins's purple finch.—Resident up the Big Thompson Valley, in summer, to timber line in the Flattop region; not yet noted elsewhere; in winter, irregularly, lower.

Crossbill.—Visitant, or sometimes resident, in the coniferous forests; infrequent and erratic.

White-winged crossbill.—Rare winter visitant in the subalpine forests.

Rosy finch.—Three species; one, the brown cap, is common in summer in the high alpine zone, nesting up to 13,000 feet; in winter, in large flocks, at lower altitudes. The graycrowns and hepburns migrate from the north.

Pine siskin.—Resident up to 9,500 feet; common but erratic; often seen in wandering flocks in late summer in the yellow pine.

Western vesper sparrow.—Summer resident, chiefly in dry meadows, below 8,000 feet.

White-crowned sparrow.—Summer resident, May to September; common throughout the park in bushy places near streams or swamps to a little above timber line.

Western tree sparrow.—Winter resident, October to March; common through the yellow-pine zone.

Western chipping sparrow.—Summer resident, frequently near habitations, at middle and lower altitudes.

Clay-colored sparrow.—Migrant and problaby a rare summer resident; shy and inconspicuous.

White-winged junco.—Winter resident at lower altitudes.

Shufeldt's junco.—Winter resident.

Pink-sided junco.—Common winter resident, October to May, occurring in flocks with the two preceding species in the yellow pine.

Gray-headed junco.—Resident; in summer abundant throughout the park, especially in dry, open montane forests; a few occasionally winter at the lower altitudes.

Mountain song sparrow.—Summer resident near streams or swamps up to 8,500 feet.

Lincoln's sparrow.—Summer resident in open, marshy places 8,500 or 9,000 feet to above timberline, but chiefly in the montane zone; more common than the preceding species.

Green-tailed towhee.—Common summer resident up to 9,000 feet, especially in sagebrush country at lower altitudes.

Black-headed grosbeak.—Rare summer resident at the eastern edge of the park at lowest altitudes.

Tanager family, 1 species.

Western tanager.—Summer resident, mostly along streams, up to 8,000 feet; not common.

Swallow family, 3 species.

Cliff swallow.—Summer resident; common locally, mostly at the lower altitudes.

Barn swallow.—Summer resident; occasionally up to 9,000 feet.

Violet-green swallow.—Summer resident, June to August; abundant up to 8,500 or 9,000 feet, nesting in cliffs, trees, or around buildings; the most common and widely distributed of the swallows, and one of the most beautiful birds of the region.

Waxwing family, 1 species.

Bohemian waxwing.—Irregular winter visitant, October to April; sometimes quite common.

Shrike family, 2 species.

Northern shrike.—Winter visitant.

White-rumped shrike.—Transient visitant, spring and autumn.

Warbler family, 7 species.

Virginia's warbler.—Reported as a rare summer resident at the eastern edge of the park.

Yellow warbler.—Summer resident along streams; common below 8,000 feet, rare above.

Audubon's warbler.—Summer resident, about May 15 to September 15; common and widely distributed, especially throughout the montane forests; abundant and conspicuous in migration.

Townsend's warbler.—Autumn transient; not common.

MacGillivray's warbler.—Summer resident along streams up to 9,000 feet, at least; fairly common, but shy and inconspicuous.

Pileolated warbler.—Common summer resident, May to September; usually in the willows near streams; 9,000 to 11,000 feet.

Redstart.—Very rare transient visitor (one record, May, 1910).

Wagtail family, 1 species.

Pipit.—Summer resident above timber line, nesting up to 12,000 feet; common at lower altitudes during spring and fall migrations, when it is seen in large flocks in open country.

Dipper family, 1 species.

Water ousel.—Common along streams; arrives in the park as the ice breaks up in the spring and reaches the subalpine lakes in summer, remaining as long as there is open water; nests throughout its range, often under bridges.

Thrasher family, 2 species.

Catbird.—Summer resident at the lower altitudes.

Brown thrasher.—Apparently only a summer visitant; rare or accidental.

Wren family, 2 species.

Rock wren.—Summer resident in rocky places up to 11,500 feet; widely distributed but nowhere common.

Western house wren.—Common summer resident up to 9,000 feet, at least.

Creeper family, 1 species.

Rocky mountain brown creeper.—Resident throughout the coniferous forests; rather rare and inconspicuous, but more frequently seen in winter than in summer.

Nuthatch family, 3 species.

Rocky mountain nuthatch (white-breasted nuthatch).—Common permanent resident of the yellow-pine zone.

Redbreasted nuthatch.—Permanent resident of the subalpine spruce forests and an occasional visitant at lower altitudes.

Pygmy nuthatch.—Permanent resident of the yellow pine forests; common, but rather erratic.

Titmouse family, 2 species.

Long-tailed chickadee.—Permanent resident, usually in deciduous growths; breeds chiefly below 8,500 feet, but wanders to higher altitudes in autumn and winter.

Mountain chickadee.—An abundant and characteristic bird of the coniferous forests throughout the park; permanent resident, 8,000 to 11,000 feet.

Kinglet family, 2 species.

Golden-crowned kinglet.—Rare summer resident, of the dense subalpine forests; visitant at middle and lower altitudes in fall migration.

Ruby-crowned kinglet.—Common summer resident, in the coniferous forests, montane and subalpine; conspicuous in fall migration at middle elevations.

Thrush family, 6 species.

Townsend's solitaire.—Widely distributed from March to November throughout the park, although nowhere common. A few occasionally remain through the winter at lower altitudes.

Olive-backed thrush.—Summer resident along streams up to 9,000 feet.

Audubon's hermit thrush.—Summer resident throughout the forests at higher altitudes; common at about 9,500 feet, especially in the Longs Peak region. Distinguished for its beautiful song.

Western robin.—Abundant in summer throughout the park and occasionally seen in mild winters at the lower altitudes.

Chestnut-backed bluebird.—Rare visitant, and perhaps an irregular summer resident at the lower altitudes.

Mountain bluebird.—Summer resident, March to October; abundant almost everywhere in open country, nesting up to 9,500 feet, at least, and wandering to above timber line in late summer and autumn.

Summary of birds.

	Species.
Resident in the park at all seasons	25
Occurring only in summer	50
Occurring only in winter	9
Transients, occurring regularly in spring and fall	7
Visitants, rare or irregular	23
Total	114

Total species to be found in summer, about 75 or 80.
Total species to be found in winter, about 35 or 40.
Bird families represented, 34.

PLANTS OF THE ROCKY MOUNTAIN NATIONAL PARK.

A. FLOWERS.

Lily family, 8 species.

White sand lily (*Leucocrinum montanum*): Dry meadows at the lower altitudes in early spring.

Wild onion (*Allium*): Three species, in open meadows up to 9,500 feet.

Red lily (*Lilium montanum*): Shady thickets at middle elevations.

Lloydia (*Lloydia serotina*): Dry meadows above timber line, July.

Yellow snow lily (*Erythronium parviflorum*): At the edge of receding snowdrifts, June and July, near timber line on the main range.

Mariposa lily (*Calochortus gunnisonii*): July and August, up to 9,500 feet.

Bunch flower family, 1 species.

False or poison camas (*Zygadenus elegans*): In moist meadows and swales throughout the park up to 11,500 feet.

Lily-of-the-valley family, 2 species.

Twisted stalk (*Streptopus amplexifolius*): Along stream banks at middle altitudes.

Solomon's seal (*Smilacina stellata*): Shady gulches.

Iris family, 2 species.

Blue flag; fleur-de-lis (*Iris missouriensis*): Early summer in wet meadows up to 9,000 feet.

Blue-eyed grass (*Sisyrinchium occidentale*): Wet, grassy places at middle elevations.

Orchid family, 6 species.

Lady's slipper (*Cypripedium fasciculatum*): In montane forests; rare.

Calypso (*Calypso bulbosa*): Rather rare, in shady gulches up to at least 10,000 feet; early summer.

Bog orchid (*Limnorchis borealis*): In swamps, at middle and high elevations, in the spruce forests.

Ladies' tresses (*Spiranthes stricta*): Moist, grassy places up to 10,000 feet; common in late summer.

Tway blade (*Listera*): In damp subalpine and montane forests; not common.

Coral root (*Corallorhiza*): Rare; in the heavy forests.

Buckwheat family, 6 species.

Sulphur flower; mountain dock (*Eriogonum*): Three species, in dry, open places up to 12,000 feet.

Mountain sorrel (*Oxyria digyna*): Moist rock crevices at high altitudes.

Wild buckwheat (*Polygonum*): Two species, alpine and montane, in moist meadows.

Goosefoot family, 1 species.

Strawberry blite (*Blitum capitatum*): Middle and lower altitudes.

Purselane family, 3 species.

Spring beauty (*Claytonia*): Three species, alpine and lower.

Pink family, 10 species.

Moss campion (*Silena acaulis*): Abundant on the alpine meadows, 11,000 to 18,000 feet.

Catch fly (*Silena scouleri*): Middle elevations.

Chickweed; Starwort (gen. *Stellaria, Cerastium*, and *Arenaria*): A large and complex group; common and widely distributed at all altitudes; at least 8 species have been collected.

Waterlily family, 1 species.

Yellow pond lily (*Nymphaea polysepala*): On Chickadee Pond, Wild Basin, and perhaps other shallow, subalpine lakes.

Buttercup family, 24 species.

Marsh marigold (*Caltha rotundifolia*): In wet meadows, up to 12,000 feet.

Globe flower (*Trollius albiflorus*): Swamps and stream banks, alpine and lower.

Columbine (*Aquilegia coerulea*): In woods and copses, at middle elevations, in early summer, and later, on moist slopes, above timber line.

Dwarf columbine (*Aquilegia saximontana*): Rocky slopes and mountain tops, 10,500 feet, and above; not common.

Larkspur (*Delphinium*): Three species, subalpine, and lower.

Monkshood (*Aconitum*): Three species, in moist dells, up to timber line.

Wind flower (*Anemone*): Three species, montane and subalpine.

Pasque flower (*Pulsatilla hirsutissima*): In early spring, on dry meadows and hillsides up to 9,500 feet.

Virgin's bower (*Clematis*): Two species, in thickets, at lower altitudes.

Buttercup (*Ranunculus*): At least 7 species; very generally distributed up to 11,500 feet; mostly in wet, open places.

Meadow rue (*Thalictrum*): One or more species.

Barberry family, 1 species.

Oregon grape (*Berberis aquifolium*): Dry hillsides, mostly below 8,500 feet.

Poppy family, 1 species.

Corydalis (*Corydalis aurea*): Roadsides, middle and lower altitudes.

Mustard family, 11 species.

Candytuft (*Thlaspi coloradensi*): Montane fields, in spring.

Brook cress (*Cardamine cordifolia*): Subalpine stream banks.

Rock cress (*Draba*): Rocky places, 2 species.

Whitlow grass (*Arabis*): Three or four species; generally distributed on hillsides and in open woods.

Wall flower (*Erysimum*): Three species, alpine and lower, in dry, open places.

Orpine family, 3 species.

Yellow stonecrop (*Sedum stenopetalum*): Common, on rocky slopes.

King's crown (*Sedum integrifolium*): Alpine stream banks; 11,000 to 12,000 feet.

Red orpine (*Sedum rhodanthum*): Marshes, 9,000 to 12,000 feet.

Saxifrage family, 8 species.

Grass of parnassus (*Parnassia fimbriata*): Wet subalpine dells; collected as yet only in the north end of the park.

Alumroot (*Heuchera*): One or two species; crevices, in rocky cliffs.

Mitrewort (*Mitella pentandra*): Wet places, in subalpine forests.

Saxifrage (*Saxifraga*): Five species have been identified; widely distributed and of diverse aspect; mostly alpine and subalpine.

Rose family, 13 species.

Dryas (*Dryas octopetala*): Alpine meadows; July.

Wild strawberry (*Fragaria*): Common in montane meadows and copses; flowers in early summer.

Cinquefoil (gen. *Drymocallis* and *Potentilla*): A large group; very common and widely distributed in open places, up to 11,500 feet; 6 or 8 species have been collected.

Avens (*Geum*): Montane copses and thickets.

Alpine avens (*Sieversia turbinata*): Very common above timber line, up to the highest altitudes (14,000 feet).

Feathery avens (*Sieversia ciliata*): Meadows at middle elevations.

Pea family, 17 species.

Yellow pea (*Thermopsis divaricarpa*): In early summer; abundant and widely distributed.

Lupine (*Lupinus*): Three species or more; common in August.

Clover (*Trifolium*): Meadows up to 12,000 feet; 4 species identified.

Vetch (gen. *Astragalus*, *Vicia*, etc.): A large and difficult group, represented in the park by at least 6 species, which are readily distinguishable.

Loco (*Aragallus*): Several species, 3 of which are common and easily recognized; dry meadows and open woods.

Geranium family, 2 species.

Purple geranium (*Geranium caespitosum*): Common generally up to 9,500 feet.

White geranium (*Geranium richardsonii*): Moist copses; most commonly 8,000 to 9,000 feet.

Flax family, 1 species.

Blue flax (*Linum lewisii*): Dry meadows below 8,000 feet.

Violet family, 2 species.

White violet (*Viola blanda*): Stream banks and moist aspen thickets in the montane zone.

Alpine violet (*Viola bellidifolia*): Wet, grassy swales, near timber line, along the main range.

Evening primrose family, 9 species.

Gayophytum (*Gayophytum ramosissimum*): Roadsides and sandy slopes.

Fireweed (*Chamaenerion*): Two species, one very common throughout the park.

Willow herb (*Epilobium*): At least three species; widely distributed.

White evening primrose (*Anogra*): One, or perhaps two, species at lowest altitudes in the park.

Yellow evening primrose (*Onagra strigosa*): Fields and roadsides; occasionally up to 9,000 feet.

Fragrant primrose (*Pachylophus* sp.): Roadsides at low altitudes.

Parsnip family, 6 species.

A large and difficult group, not as yet worked out in the park. One tall, stout species, *Heracleum lanatum*, is common along streams. Other genera represented are *Ligusticum, Angelica, Pseudocymopterus,* and others. Six species have been collected, and doubtless many more will be found by further exploration and study.

Wintergreen family, 5 species.

Wintergreen (*Pyrola*): Two species (*Chlorantha* and *Secunda*), in the heavy, coniferous forests, 9,000 to 10,000 feet.

Purple wintergreen (*Pyrola uliginosa*): In bogs, in the higher forests.

One-flowered wintergreen (*Monenses uniflora*): Subalpine forests.

Pipsissewa (*Chimaphila umbellata*): Dry woods, montane and subalpine.

Indian pipe family, 1 species.

Pinedrops (*Pterospora andromeda*): Rare, in dry, coniferous woods.

Heath family, 2 species.

Dwarf laurel (*Kalmia polifolia*): Subalpine bogs and lake shores.

Bearberry; Kinnikinnick (*Arctostaphylos uva-ursi*): Common everywhere, on open gravelly hillsides.

Huckleberry family, 2 species.

Bilberry (*Vaccineum*): Two species, in forests or often on burnt lands; 9,000 to 10,000 feet.

Primrose family, 5 species.

Alpine primrose (*Primula angustifolia*): Dry, alpine meadows.

Brook primrose (*Primula parryi*): Along cold streams and on wet cliffs; 10,500 to 13,000 feet.

Androsace: Two species; one, the rock jasmine, common on high alpine meadows.

Shooting star (*Dodecatheon* sp.): Wet meadows and springy places, in early summer.

Gentian family, 13 species.

White gentian (*Pleurogyne fontana*): Moist montane meadows. This and the following members of this family bloom in the late summer and autumn.

Fringed gentians (*Gentiana*): Two species (*Elegans* and *Barbellata*), in west meadows and thickets; 8,000 to 9,500 feet.

Field gentians (*Gentiana*): Three species; dry meadows.

Rose gentians (*Amarella*): Two species, subalpine and montane

Alpine gentian (*Gentiana romanzovii*): Common on the meadows above timber line.

Dwarf blue gentian (*Chondrophylla americana*): Alpine stream banks; as yet only from the north end of the park.

Star gentian (*Swertia*): Two species, in bogs and swales; subalpine and lower.

Monument plant, green gentian (*Frasera speciosa*): On open, dry slopes; up to 11,000 feet or higher.

Buck bean family, 1 species.

Menyanthes trifoliata: As yet only from Chickadee Pond, Wild Basin; 10,000 feet.

Dogbane family, 1 species.

Indian hemp (*Apocynum androsaemifolium*): Generally distributed in the montane zone, but not common.

Phlox family, 8 species.

Alpine phlox (*Phlox caespitosa*): Meadows above timber line.

Gilia: Two species, one (the red trumpet flower) only on the western edge of the park.

Polemonium: Five species, mostly alpine and subalpine, with handsome blue, white, or yellow flowers.

Waterleaf family, 4 species.

Waterleaf (*Hydrophyllum fendleri*): In moist meadows and copses; middle elevations.

Phacelia: Three species, at least; one (*P. sericea*) the showy "blue pincushion" of early summer.

Borage family, 6 species.

Stickseed (*Lappula*): One or two species, at middle elevations.

Miner's candle (*Oreocarya virgata*): Dry ground, in open places.

Chiming bells (*Mertensia*): Three species, widely distributed; one (*M. ciliata*) very common on subalpine stream banks.

Forget-me-not (*Eritrichium argenteum*): Dry alpine meadows.

Mint family, 3 species.

Skullcap (*Scutellaria brittoni*): Hillsides, up to 9,000 feet.
Horsemint (*Monarda* sp.): Dry places, at the lower altitudes.
Woundwort (*Stachys palutris*): Wet places, at middle elevations.

Figwort family, 26 species.

Blue-eyed Mary (*Collinsia tenella*): Hillsides, middle and lower altitudes.
Figwort (*Scrophularia occidentalis*): Occasional, at lower altitudes.
Pentstemon: A large group, widely distributed, in open places, with abundant, showy flowers, in early summer; six species collected to date, but probably several more occur.
Chionophila jamesii: Common, on the alpine meadows.
Speedwell (*Veronica*): Three species identified; one alpine, the other two subalpine and lower, in wet places.
Monkey flower (*Mimulus*): Two species, in the north end of the park.
Pedicularis: Three species, of diverse aspect, in forests, 9,000 to 11,000 feet.
Little red elephant (*Pedicularis groenlandica*): Open swamps, alpine and lower.
Paintbrush (*Castilleja*): At least seven species are readily distinguished.
Orthocarpus luteus: Montane meadows.

Madder family, 2 species.

Bedstraw (*Galium*): Two species, one (*G. boreale*) very common, at middle elevations.

Honeysuckle family, 1 species.

Twin flower (*Linnaea americana*): In coniferous forests, subalpine or lower.

Bluebell family, 3 species.

Harebell (*Campanula*): Three species, common, and occurring throughout the park at all altitudes.

Valerian family, 1 species.

Valeriana acutiloba: Subalpine forest bogs, along the main range.

Composite family, 50 species.

Golden aster (*Chrysopsis*): Two or more species, in late summer.
Tonestus pygmaeus: In the alpine meadows.
Goldenrod (*Solidago*): Several species (3 collected); generally distributed.
Aster (gen. *Aster* and *Machaeranthera*): Many species (4 collected), mostly with blue or purple ray flowers.
Daisy (gen. *Erigeron*, *Townsendia*, etc.): A very large group, not yet worked out for the park; occur almost every place except dense forests; 8 species have been noted, 3 or 4 of which are very common.
Everlasting (*Antennaria* and other genera): Four species or more, in dry meadows or open woods.
Cone flower; black-eyed Susan (*Rudbeckia*): Up to 9,000 feet.
Sunflower (*Helianthus*): At lower altitudes.
Alpine "sunflower" (*Rydbergia grandiflora*): Meadows, above timber line, and grassy slopes, up to 13,000 feet.
Gaillardia aristata: Very common at middle elevations.
Yarrow (*Achillea millefolium*): Abundant throughout the park, except in heavy forests.
Sage (*Artemisia*): Four or five species, one alpine, other lower.
Arnica: Three species.
Ragweed (*Senecio*): Common at all altitudes; many species (5 collected).
Thistle (*Carduus*): Three species noted.
Hawk's Beard Crepis. One species: collected at Specimen Mountain.
Hawkweed (*Hieracium*): Two species noted.
False dandelion (*Troximon*): Two species, one common, in meadows, in late summer.
Dandelion (*Taraxicum*): One or more species.

B. FLOWERING SHRUBS, 15 SPECIES.

Gooseberry (*Ribes*): At least 2 species; occasional, up to timber line.
Jamesia americana; hydrangea family: Rocky canyon and hill slopes, up to 10,000 feet, in some localities.
Nine-bark (*Physocarpus*); rose family: Moist canyon, at low elevations.
False raspberry (*Bossekia deliciosa*): Dry hillsides, below 9,000 feet.
Raspberry (*Rubus strigosus*): On dry slopes, often on burnt land, at all altitudes, up to timber line.
Shrubby cinquefoil; "sage rose" (*Dasiophora fruticosa*): Common in the montane zone, blooming throughout the summer.
Wild rose (*Rosa*): One or more species, in open woods, on dry hill slopes, and roadsides.
Service berry (*Amelanchier*); apple family: One species reported, from the lowest altitudes.
Mountain ash (*Sorbus scopulina*): Occasional, up to 10,000 feet.
Chokecherry (*Prunus melanocarpa*); plum family: Rocky slopes and canyon sides, below 9,000 feet.
Mountain balm (*Ceanothus velutinus*); buckthorn family: Common along hill and moraine slopes, at low altitudes.
Buffalo berry (*Shepherdia canadensis*): In woods, middle elevations.
Elder (*Sambucus*): Occasional, at middle elevations
Honeysuckle (*Lonicera involucrata*): In woods, to 9,000 or 10,000 feet.

C. SHRUBS WITHOUT CONSPICUOUS FLOWERS, 11 SPECIES.

Juniper (*Juniperus sibirica*): Open rocky places, up to 10,000 feet.

Willow (*Salix*): Many kinds, mostly near streams or in swamps, up to 12,000 feet; 6 species are easily distinguished.

Rocky Mountain birch (*Betula fontinalis*): Along streams, below 8,500 feet.

Bog birch (*Betula glandulosa*): Chiefly on alpine meadows and marshes, 11,000 to 11,500 feet, but occasionally lower.

Alder (*Alnus tenuifolia*): Large shrub or small tree, along streams, up to 9,500 feet.

Maple (*Acer glabrum*): Widely distributed, up to 9,000 to 9,500 feet.

D. TREES, 10 SPECIES.

Limber pine (*Pinus flexilis*): On dry slopes and wind-swept ridges, 9,500 to 11,000 feet, assuming picturesque forms at timber line.

Lodgepole pine (*Pinus contorta*): The characteristic conifer of the montane zone; chiefly 8,500 to 9,500 feet, occasionally to 10,000 feet; forming dense, second-growth forests on burnt lands, at middle elevations.

Western yellow pine (*Pinus ponderosa*): A prevailing tree of the foothill zone, extending into the lower section of the park, up to 9,000 feet, in favorable situations.

Engelmann spruce (*Picea engelmanni*): The characteristic tree of the subalpine zone, 10,000 to 11,000 feet, where it forms dense and extensive forests, especially on moist areas; varies from a low, matted shrub, at timber line, to a stately tree, 4 or 5 feet in diameter and over 100 feet tall; reaches its finest development in sheltered gorges, at 10,500 feet; occasionally down to about 9,000 feet.

Blue spruce; silver spruce (*Picea parryana*): Along canyon streams, up to about 8,500 feet.

Alpine or "balsam" fir (*Abies lasiocarpa*): Occurs with the Engelmann spruce in subalpine forests, mostly near streams.

Douglas fir or spruce; false hemlock (*Pseudotsuga taxifolia*): On dry and often northerly slopes, up to 10,000 feet, on the higher foothills, but infrequent along the main range; also called "red fir."

Rocky Mountain juniper: red cedar (*Juniperus scopulorum*): A few, in rocky places, at lowest altitudes in the park.

Aspen; "Quakin' asp" (*Populous tremuloides*): The commonest deciduous tree of the park, occurring at all altitudes up to 11,300 feet; most abundant and finely developed in the montane parks at about 9,000 feet, where it forms handsome groves.

Narrow-leaved cottonwood (*Populus angustifolia*): Along streams, below 8,000 feet.

Summary of plants collected or identified.

	Species.
Flowers, including flowering shrubs	289
Trees and flowerless shrubs	21
Ferns and fern allies, grasses, sedges, and rushes (about)	50
Total	360
Number of plant families represented	55

SULLYS HILL NATIONAL PARK.

S. A. M. YOUNG, Acting Superintendent, Fort Totten, N. Dak.

GENERAL STATEMENT.

Sullys Hill National Park is a beauty spot in a locality where rolling prairies and grain fields are more common than attractive scenery. Hugging the south side of Devils Lake rugged hills, partly covered with a luxuriant growth of timber, afford an ideal home for the elk and deer recently placed in the park, while Sweetwater Lake, within the park, and the shaded picnic grounds near by present an attractive resting place for a day or two. Leading from the picnic grounds are numerous paths through scenes of great beauty, where the nature lover may listen to the songs and observe the habits of every bird known to North Dakota. In the picnic grounds are numerous squirrels, which play about practically unmindful of visitors. For those who are fond of boating, Sweetwater Lake offers an inviting opportunity. On account of the sheltered location its waters are generally without a ripple and are so clear that the luxuriant growth of aquatic plants at the bottom may be easily studied. Sullys Hill beach at the north side of the park is an ideal bathing place, where many groups of bathers spend a pleasant Sunday afternoon. Not only is the park surrounded with historic interest, but there are traces of prehistoric times very inviting to the archæologist.

HOW TO REACH THE PARK.

The park can most conveniently be reached from Devils Lake, on the Great Northern Railroad, the distance being about 15 miles. Parties should provide camping outfits if it is desired to spend more than one day at the park, since no hotel accommodations are available.

INCREASED NUMBER OF VISITORS.

As the attractions to be found at Sullys Hill Park become more widely known, the number of visitors increases. During 1918 there were 40 visitors in April, 116 in May, 1,887 in June, 1,116 in July, 694 in August, and 335 in September, a total of 4,188 for the season, against only 2,207 last season. Thus far there has been little tourist travel, but this is largely because the park is, as yet, little known. During the summer a number of picnic parties, notably a Red Cross picnic and a party from the Indian School, have enjoyed the use of the picnic grounds.

WILD ANIMALS.

The elk and deer placed in the park last season are doing well and their numbers are increasing. On account of the dense foliage and opportunities for hiding, the number of young can not be accurately determined. The wild animals have done well during the winter, with very little feeding. Arrangements are now being considered to add a number of bison to the attractions of the park.

RECOMMENDATIONS.

The roads in the park, especially the one leading to Sullys Hill Beach, should be improved, inexpensive bathing houses should be constructed at Sullys Hill Beach for the convenience of bathers, two or three additional rowboats should be provided for Sweetwater Lake, and a shed should be constructed on the picnic grounds to shelter visitors in case of rainstorms. The present rule which prohibits the entrance of automobiles into the park should be abolished. Many persons not physically strong find the walk from the gate to the picnic grounds burdensome, not to speak of the matter of carrying lunch from the gate to the grounds, the distance being about a quarter of a mile.

THE SIEUR DE MONTS NATIONAL MONUMENT.

GEORGE B. DORR, Custodian, Bar Harbor, Me.

THE FOUNDING OF THE SIEUR DE MONTS NATIONAL MONUMENT.

The Sieur de Monts National Monument had its origin in the active desire of two men—President Emeritus Eliot, of Harvard, and George B. Dorr, of Boston, both for many years summer visitors and residents upon Mount Desert Island—to save to public freedom and the people's use all that might prove possible of the magnificent coastal scenery of the island. And to the cooperation given them by others.

An association for the purpose was formed, of which Dr. Eliot became president and Mr. Dorr vice president and executive officer. The stated object of the corporation was, as rehearsed in a special act of the Maine Legislature passed in 1903 giving it relief from taxes, "to receive, hold, and improve for public use lands in Hancock County, Me., which by reason of historic interest, scenic beauty, or other cause" were suited for such purpose.

It was not until five years later, however, in the summer of 1908, that the corporation received its first gift of land, the Bowl and Beehive tract on Champlain Mountain, generously given by an early summer resident who lived upon the shore below and owned the land.

That same fall, Mr. Dorr, encouraged by this gift, entered actively upon the work which eight years later was to result in the establishment of the Sieur de Monts National Monument.

His first step was to secure the summit of the island, which has now passed into the Nation's keeping as the highest point upon our eastern coast. This, the summit of a bold and massive granite mountain rising from the ocean front and looking seaward far beyond our country's bounds, became the nucleus around which, year by year, the reservation grew, until in the spring of 1913 it had reached proportions that, joined to its unique landscape character and historic interest, made it seem worthy to Mr. Dorr and President Eliot of offering to the Government for a national park.

A year later, in the spring of 1914, Mr. Dorr came to Washington with plans matured and laid the matter before the Secretary of the Interior, the Hon. Franklin K. Lane, who encouraged him warmly to go on with it.

After two further years spent on consolidation of the tract and the removal of imperfections in its title by purchase, suits in equity, and other means, Mr. Dorr returned and offered it formally to the Government for a national monument in the following letter addressed to Secretary Lane:

MAY 3, 1916.

Hon. FRANKLIN K. LANE,
Secretary of the Interior, Washington, D. C.

SIR: On behalf of the Hancock County Trustees of Public Reservations, State of Maine, I have the honor to offer in free gift to the United States a unique and noble tract of land upon our eastern seacoast for the establishment of a national monument.

The tract offered is rich in historic association, in scientific interest, and in landscape beauty; and it contains within itself the only heights that immediately front the open sea with mountainous character upon our eastern coast.

It contains also, owing to past glacial action and its own variously resistant rocky structure, an extraordinary variety of topographic features which unites with the climate caused by the surrounding sea to fit it beyond any other single locality in the East for the shelter, growth, and permanent preservation of a wide range of life, both plant and animal.

It forms a striking and instructive geologic record, and it constitutes the dominant and characteristic portion of the first land, Mount Desert Island, to be visited, described, and named by Champlain when sailing under De Monts' orders in exploration of the New England coast.

The papers I inclose herewith explain in detail the thought and purpose of the offered gift, with the reasons which have led us to conviction of its exceptional public value and worthiness to be accepted.

I remain, sir, with respect,

Sincerely yours,

GEORGE BUCKNAM DORR.

The monument act is an act passed in 1906, during President Roosevelt's administration, which gives the Secretary of the Interior power to recommend for presidential proclamation as members of the national-park system, under the title of national monuments, lands belonging to the Government, or freely offered to it from a private source, whose historic interest or scientific features make such preservation desirable in the public interest.

Secretary Lane drew up a proclamation accordingly, for the President's signature; an interview with President Wilson followed; and two months after, on the 8th day of July, 1916, the President signed the proclamation, creating thereby virtually, though not as yet in name, the first national park of scenic character to the east of Colorado and instituting a new departure in our national-park policy, broadening its scope.

A SEACOAST NATIONAL PARK.

The Sieur de Monts National Monument has advanced rapidly during the past year along the lines designed by Secretary Lane and the National Park Service, who plan to develop it as a seacoast national park, representing in its finest form New England's splendid contribution to the national refreshment in its embayed and rock-bound, many-harbored coast.

At Mount Desert—the "Island of the Wild and Solitary Mountains," as Champlain named it upon sight, and there alone, New England's granite hills come down to battle with the sea, fronting it with the boldest surf-worn cliffs upon the North Atlantic to the south of Labrador, against which the waves dash up in heavy sheets of spray in winter storms 180 to 200 feet in height. But on either side of the island, connecting at its back, two great landlocked bays—Frenchmans Bay, the one-time rendezvous for French descents on the New England coast, and Blue Hill Bay, at the mouth of Union River—inclose it with quiet, lakelike reaches of the sea, which stretch away for 40 miles to Penobscot Bay, through what Champlain—who took the trip in the early month of September, 1604, with the Indians as his guides, ascending the Penobscot River finally for another 40 miles of tidal water—described as an archipelago of islands, naming their great outpost also Isle au Hault.

UTILIZATION OF THE OCEAN WATERS.

These sheltered waters, with their wide freedom and beautiful surroundings, play an essentially important part in the plans prepared for the new park's development. They are an absolute possession of the people, nationally owned, and offer unique opportunities for refreshment to numbers without limit, taken in connection with the island park. As in the West camping opportunities are supplied and opportunity for camping trips afforded, so here a well-organized house-boat system, supplementing hotels upon the shore, will at some future time provide the infinite and cool refreshment of life upon a northern sea, where one may move about from place to place in quiet security as the wish may come, and bathe and fish and paddle and watch the sunset light reflected in the water with a beauty few even of the most costly sites on the New England coast command.

It is a great opportunity, the utilization of a great, wholesome recreational asset of the people, as yet unused save by a few visiting yachtsmen with boats that can brave the open sea and leisure to sail them. Such boats are generally costly for the service which they render and the space they yield. These of house-boat type, not meant for cruising on the open sea, with its high waves and sudden storms, can be very simply built, designed for space, and provided only with such power as may suffice to move them about as temporary homes within the hundreds of square miles of quiet waters, which, thus utilized, would constitute a unique ocean park, widening unlimitedly the scope and area of a magnificently situated land, one placed upon the ocean verge.

With this in view, lands with good harborage are being gradually secured upon the shore and plans for the full ultimate utilization of the opportunity are being step by step worked out.

A WAR MEMORIAL.

Another interesting development that is planned, inspired alike by the historical associations of the monument and by the intense feeling that the war, with its high ideals and willing human sacrifice arouses, is the utilization of the splendid monumental character of these ice-sculptured granite mountains to form upon lands once owned by France a nobly suitable memorial of the contest overseas. These mountains, discovered and named by Champlain and held for over a century by France, look out toward her with a majesty and dignity no work of man could equal across the great ocean highway which our troops are traversing. They are now nationally owned. And they will endure for ages.

Following out this thought, the Secretary of the Interior and the National Park Service design to commemorate on the island's massive summit, with its splendid eastward outlook toward the scene of battle, both those who fall in the Nation's service and the sacrifice of those who shall return disabled, and to make of its gigantic eastern spur, that faces equally across the sea from almost equal height, a memorial to the Air Service of the Nation, which has sprung into sudden, swift existence under the impetus of the present struggle and contemporaneously with the park's creation.

Names recalling the old French association of the island and this intended war-time consecration have been given the individual mountains, replacing earlier ones of no significance, the island summit being named after the island's first possessor, Cadillac Mountain; its great eastern neighbor, divided from it only by a deep ravine, the Flying Squadron; and the mountain to the east of this, looking out like a huge headland upon Frenchmans Bay over the waters Champlain sailed on his approach, Champlain Mountain, with a few more besides.

ENLARGEMENT OF THE MONUMENT.

Important extensions of the monument by further gifts of land have been made during the past year. Kebo and its adjoining peak in the Flying Squadron ridge have been added, extending out the park to meet the golf links in the immediate vicinity of Bar Harbor and giving it a new approach by Flying Squadron gorge. New lands have also been acquired at the island's opposite edge, from 12 to 15 miles away as the crow flies, with a great dividing inlet of the sea, Somes Sound, a superb park water belonging to the Nation, lying in between.

All the mountain peaks lying to the west of this fiord or sound, none of which were included in the original acceptance by the Government, have now been acquired, in a practically continuous succession, though much remains to get along their sides. Study of their titles is being made to prepare them for the Government's acceptance, already agreed upon with the Secretary of the Interior.

RECOGNITION BY CONGRESS.

A great step forward has been taken also during the past year in the recognition given the monument by Congress, who granted it last spring its first appropriation for maintenance and protection and set it aside in so doing from the western monuments as a true national parkland for the use and enjoyment of the people, and who have since passed in the Senate and favorably recommended in the House a bill to convert it accordingly from a national monument to a national park.

This creation is in line with the intention of the National Park Service to extend into central and eastern regions of the country its benefits and work, a policy destined to increase enormously its public usefulness.

PLANNING FOR THE FUTURE.

Constructive work in the park, unless in urgent matters of detail to maintain and complete the usefulness of what now exists, must wait for lack of labor and because of the desire to withdraw none from war-essential purposes until the war is over. But plans for the future are being steadily worked out to give the park its greatest usefulness as a recreative opportunity for the people. And its interest alike as an historic record and a great nature monument is being steadily extended by publications issued in its name that are already sought, for educative and other purposes, by people dwelling as remote from it as Colorado, Arkansas, Utah, and the Pacific coast.

WILD LIFE AND WOODLAND PROTECTION.

The park is now, since July 1, being protected under its congressional appropriation. Deer are returning, and will soon grow tame; birds are finding a safe home and nesting place within its bounds; work is being done upon the old-time trails to restore or maintain their usefulness; and necessary guardianship of its woods has been established, together with such repair of damages as the amount of the appropriation renders possible.

IMPROVEMENT OF APPROACH.

An important advance made during the past 18 months in the development of the approaches to the park is the replacement, by order of the National Government, of the old and insecurely constructed wooden bridge and draw connecting Mount Desert with the mainland by a steel and concrete one of modern type designed by Government engineers, and the elimination, by joint action of the towns in which the park lands lie, of the old toll charges on the bridge. This extends, at a cost that can not be less in sum than $150,000 when the work is done, the already good road system of Mount Desert Island, by which the national park is variously reached, to meet without a break the State road system of the mainland, and gives the park approach by motor full advantage of the latter.

INFLUENCES UPON THE PEOPLE.

Such a park, so chosen for landscape and historic interest, so rich in varied wild-life and plant-life opportunities, so widely visited and accessible by many people, and so related to the Nation's great possession in a hundred and odd miles of island-sheltered waterways along the ocean front, can not fail in its development under a wise national policy and in organized relation to other national park lands to exert a profound influence upon the development among the people of a sane and wholesome love of nature and an outdoor life and a deepened consciousness of national existence.

MOUNT DESERT ISLAND AND THE LAND TITLES IN THE PARK.

Mount Desert Island lies off the old French-Acadian coast of Maine, midway between the mouth of the Kennebec and that of the St. Croix, where our national boundary now takes its start at the site of De Monts' first colony. It is the largest rock-built island off the entire Atlantic coast of the United States and the only spot upon it where mountains come down to meet the sea. It was discovered by Champlain on September 5, 1604, in his exploration of that coast as De Monts' geographic. He named it from his first impression from the water as he came sailing into Frenchman's Bay, "l'Isle des Monts deserts" ("the Island of the Wild and Solitary Mountains"). His name was afterwards adopted by the English, who Anglicized its form but left the accent, where it still remains in local usage, on the final syllable of the word Desert.

Granted in 1688, by Louis XIV, to Antoine de la Mothe Cadillac, the later founder of Detroit and governor of Louisiana, it passed into the possession of the English in 1713 by the peace of Utrecht, and thence, a generation later, into that of the Province of Massachusetts, which gave its western half in 1762 to Sir Francis Bernard, the last colonial governor of Massachusetts, confirming it afterwards to his son, John Bernard, and gave its eastern half, when now the Commonwealth of Massachusetts, to the granddaughter of Cadillac, Madame de Gregoire, out of gratitude for the part that France had played in the American Revolution.

It is from these two sources—one French, one English, and each deriving title originally from a royal or provincial grant—that all land titles in the present national park are drawn, unless a few from early settlers' rights through occupation.

This is but the barest of outlines. From first to last the island's story and the story of that of which it forms a part are full of interest. The Indian background, with its stone-age hunter's life; the hardy venturing of fishermen in the sixteenth century from the coasts of France, who brought back with them, as King Henry tells in De Monts' commissions, where it first appears in print, the name Acadia and left their own in Cape

Breton; the coming of De Monts across the sea to take possession of a vast and unknown territory in the name of France; his gallant struggle against the bitter winter, hostility, and adverse conditions; the thrilling first exploration of the Bay of Fundy and the New England coast as far as to Cape Cod, told in Champlain's pages; the Jesuits' missionary expedition that succeeded him, and the fateful wrecking of their peaceful colony on the Mount Desert shore; Cadillac's feudal lordship of the island by a royal grant; the long contest with the "Bostonnais" and English for the possession of Acadia and the final overthrow of the French power in the Acadian region; the gift of the island by Massachusetts Province to Sir Francis Bernard, and Bernard's visit there before the Revolution; the birth of the United States and springing up of town-government life in this originally feudal region; the discovery by artists of the beauty of the island and first beginning of a summer life; and finally the establishment on its shores and mountains, that have seen this all, of the United States' first eastern national park, linking them as a possession of the people with every other section of the country, East and West, and making them, with their early French associations and contact with the sea, the one fit site to commemorate in an enduring nature monument France's old historical relation to America and America's participation in the present war for the freedom of the seas and France's preservation. That is the human side.

The land itself makes its own separate appeal to the imagination. Like parts of northern Scotland and the Scandinavian Peninsula, which it resembles, it is ancient and timeworn beyond the power of human thought to realize. When the rocks that surround the intrusive granite of the mountains were first laid down in level strata in an ancient ocean, no animals or plants existed, geologists say, upon the land, nor fish of higher order in the sea. Stage by stage these rocks have witnessed the whole development and evolution of the world we know.

The National Park Service intends to have each national park's associated geologic history told for its visitors in plain and simple language. Each is individual and makes its individual appeal, one telling of ancient volcanism, of fiery eruptions and great ash deposits burying and preserving forests; another, of ancient deserts whose sands the winds heaped up along adjacent ocean shores now far in the interior; a third, of sierra-forming crustal fractures and great earthquake shocks; and others yet, of long-continued stream erosions that reveal successive chapters of the past; of ancient swamp lands, beautiful with a vegetation that the world has lost, and of strange reptile forms that haunted them; or of the steady rain of shells of limestone-forming organisms in ancient seas which has built up extensive continental areas, such as the Mammoth Cave and blue-grass regions of Kentucky. A wonderful story may be made of this, but no part of it will be more interesting and instructive than that of the time-resisting rocks at Mount Desert which knew the Mississippi Valley as an inland ocean and saw the first beginnings of our flowering plants.

Formerly the Mount Desert Range stood inland, for the ancient coast line runs—submerged—where the famous Georges and other fishing banks now are, the sea beyond them plunging precipitously down 3,000 feet, and it is the deposits of the melting ice sheet on that earlier shore that make the ideal, clean, rock-and-gravel bottom, shallow and sun-reached, the cod and haddock love. Between this and the Mount Desert hills a valley 100 miles in width stretched in recent geologic time, forest-clad and peopled in their day by herds of browsing mastodons,[1] whose old stream courses, widened and deepened into pockets here and there by later ice erosion, and gathered into a single, deeply canyoned river at their outlet, may still be roughly traced by charted soundings that the Government has made.

When the ocean flooded this great valley by coastal subsidence, what is now Mount Desert Island remained above the sea to form the highest headland on our eastern coast; and as the earth's crust undulated, sinking down still further as surf-cut shore lines on the rocks and mountains show it did—borne down by the ice sheet's weight, perhaps—the present island must for a long Arctic period have been a group of wild and solitary, storm-swept crags jutting from the open sea[2] and haunted by walrus and seal and birds innumerable.

The mountain range itself is scarce above a dozen miles in length and seems, as geologists now read its story, to have once formed a single granite block—the base of some ancient, solitary, widely dominating peak, long since vanished before the atmosphere's attack—across which the ice sheet plowed, searching out its lines of weakness, until its once continuous mass presented as it does to-day—for this is recent history in a geologic sense, and the old ice markings still remain to tell their tale—a dozen or more deeply isolated mountains, ranging from seven or eight to fifteen hundred feet in height but bold and mountainous out of all proportion and singularly impressive in contrast to the great ocean plane from which they rise. Their tops are bare, as Champlain did not fail to note, but every lower slope upon them, not precipitous, and the valleys at their feet were densely wooded once with splendid forest—as all will be again under the Government's protecting care—while fresh-water lakes and meadows and an ocean fiord fill the deep basins that the ice ground out between them and at their northern bases. So sculptured and surrounded, they offer a variety of landscape within a narrow compass no other single spot I know can equal, and an extraordinarily favorable habitat in consequence for the preservation and future study of a wide range of native life.

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[1] And horses probably, remains of one having been found upon Marthas Vineyard Island, part of the mainland then and close to the valley's southern edge.

[2] Mount Desert Island, with its magnificently resistent range of granite mountains thrown directly athwart the ice sheet's seaward course and scored on its seaward side by surf lines as it rose or sank, forms one of the most striking exhibits of glacial attack and strongest evidences of the shifting level of the land in reference to the sea the world can show. The subsidence in that region at the ice sheet's melting seems to have been between two and three hundred feet. A vast bed of bowlders, many of them of gigantic size, through which the railroad passes twenty-odd miles inland from the head of Frenchmans Bay, marks apparently where the lessening ice sheet dropped its burden as it met the sea. Then the mountains only of the island would have risen above the ocean level, forming a group of four or five lesser islands, bare rock masses with narrow, fiordlike waterways between, and frowning cliffs.

That this area, with its early, intimate associations with the sea and the extraordinary opportunity it offers for future house-boat life upon it, should become, as the National Park Service plans, the representative New England national park, giving the ocean to the Nation's people for recreative purposes, is singularly fitting. For the ocean it was that made New England and gave her sons—now scattered the whole country over—the adventurous spirit, the enterprise and self-reliance and broad outlook on the world that have made them a force wherever they have gone, to the whole Nation's profit.

EL MORRO NATIONAL MONUMENT.

EVON Z. VOGT, Custodian, Ramah, N. Mex.

El Morro is a sheer cliff about 300 feet high and looks from a distance like a huge fortress, hence its name. On both sides of its smooth gray walls are many interesting pictographs made by prehistoric inhabitants of the country, probably the Aztecs. There are hundreds of pictures of deer, snakes, bears, wild sheep, moons and crescents, signs of lightning, and the swastica, human hands, feet, and figures, both male and female, all carved into the surface of the rock in serial, seemingly telling a story no modern man has been able to translate.

No doubt it was the existence of these prehistoric glyphs and the fine spring at the foot of the cliff which led the early Spanish conquistadores to stop and make camp here and leave records on the walls of the dates, names, titles, and purposes of their expeditions to this wild country. To-day one may read the beautifully carved inscriptions, which are all in the Spanish language.

The earliest inscription is 1526, but the most important one historically is the one left by Don Juan de Oñate, the great Spanish colonizer, who established the first settlement in New Mexico and built the first church at a place near the present Chamita in 1598. Later he founded the present capital of this State at Santa Fe in 1606.

There are some 20 inscriptions dating back to the seventeenth and eighteenth centuries, which throw an historical importance around the monument which is bringing many travelers every year.

During the past season El Morro National Monument has been made more easily accessible to the traveling public.

The automobile road leading south from Gallup to El Morro or Inscription Rock, as it is most generally known, has been much improved, so that the trip can be made nicely in three to four hours by the way of Ramah, or in six hours by the way of Zuni, where an interesting time can be spent in seeing this famous terraced city of the Zuni Pueblo Indians.

At Gallup a new Fred Harvey hotel, known as El Navajo, offers accommodations and cuisine of the premier class to the traveling public. Automobiles with guides can be rented at Gallup for visiting all this country.

El Morro itself has been made more attractive by the Park Service this year in a number of ways. The spring located on the south side of the rock has been developed after being lost and buried for a great many years. The water has been compounded, and an antifreeze pump brings the water from the spring. As many people visit the monument with teams or on horseback, a watering trough has been placed at the spring.

A handsome new camp house for visitors has been constructed of logs. It is provided with a table and benches, and it is large enough to accommodate an automobile, as well as a camping party, for the night. There is firewood in the natural timber close by, while the spring is reached by a convenient footbridge. A footbridge also leads to the inscriptions and another from the inscriptions to the spring.

Translations of the most important inscriptions have been placed below the writings. Some are accompanied by short sketches giving the historical identity of the author.

A bridge has been built over the arroyo at the point of the rock, permitting automobiles to pass around to the camp house, and also connects up the new road which has been improved and signed from Grant, N. Mex.

The Grant road offers perhaps the most scenic entrance into the country. Grant lies on the Santa Fe Railway, 60 miles east of Gallup, and is also on the transcontinental highway for auto traffic. This road is signed from Chicago to Los Angeles, Cal. At Grant there are excellent accommodations to be had at the hotels, and automobiles can be rented.

One of the finest trips imaginable can be made by starting from Grant, going through the town of San Rafael; thence along the new road leading along the foothills of the Zuni Mountains. One rides for miles through the beautiful pine forests. On the left is one of the most rugged lava flows in the west, offering varying scenery. El Morro lies 50 miles from Grant. From the rock the trip to Ramah, 11 miles, and Gallup, 40 miles, can be made in three or four hours.

The weather is always delightful at the altitude of the monument, it never getting very hot at 7,000 feet, while the immense pines and beautiful scenery make the place ideal for camping.

The two ruins of extensive prehistoric Indian towns on top of the monument can be reached by climbing the cliff along the east side of the rock and about 400 yards south of the spring. These ruins have never been opened by the archaeologist and are being protected for the purpose of excavation under the direction of the Park Service.

The custodian of the monument is Evon Z. Vogt, who lives on the main road from Gallup to the monument, at his ranch 1 mile south of Ramah. In Mr. Vogt's pasture are interesting cliffs dwellings, which can be seen by a short detour from the regular road.

The Navajo Indians live in considerable numbers thereabouts, and the squaws may be found weaving the famous Navajo rugs, which they make from the wool of their sheep.

PETRIFIED FOREST NATIONAL MONUMENT.

WILLIAM NELSON, Custodian, Adamana, Ariz.

The Petrified Forest has during the past year undergone no noticeable changes. The arid climate of Arizona is preserving wonderfully the glittering ruins of the prehistoric forest. Some surface oxidization is going on, but this is not detrimental, as it generally changes the colors of the petrified wood into still brighter hues.

The washing away of the soil in some portions of the log-bearing strata uncovers still more sections and fragments of the petrified logs. Thus the small specimens carried away by tourists have in no way impaired the monument.

IMPROVEMENT DURING THE PAST FISCAL YEAR.

A substantial support has been provided for the Natural Bridge; a heavy, reinforced concrete beam now insures this petrified log against breaking and tumbling into the gulch below. The support is strong enough to last for a long period of years, but a waterproofing paint should be applied to prevent the concrete from becoming unsightly.

ROADS.

The roads leading to and connecting the different forests are sadly in need of repair.

The part of the transcontinental highway (Albuquerque-Springerville-St. Johns-Holbrook) which lies within the Third Forest is in better condition than the roads connecting the First, Second, and Third Forests. The road between the Second and the Third Forests is only a rough trail, and its improvement is earnestly recommended. After this road is made passable and comfortable for the auto traffic the auto tourists, which lately have increased considerably in number, will be able to see the Second Forest with its brilliant coloring and also the Natural Bridge, the most notable sight in the monument.

In view of present road conditions the majority of the motoring public sees only a corner of the Third Forest, and abandons the trip to the other forests and the Petrified Bridge as impracticable. To proceed north to Holbrook and east to Adamana, thence south to the First and Second Forests, means a side trip of 31 miles.

To the tourist motoring on the Albuquerque-Gallup-Holbrook highway (in scenic respect much to be preferred to the southern route), the Petrified Forest offers a more reasonable side trip (9 miles); the only obstacle to be reckoned with is the occasional high-water in the Rio Puerco, rendering this river impassable.

TRAVEL.

The Petrified Forests are seen by visitors every month in the year; the climate of this part of Arizona enables the tourist to make his visit to the forest a delightful outing almost any day in the year.

Tourists traveling by rail will find at Adamana auto stages making daily trips to the most attractive and interesting points in the forests; a hotel furnishes accommodations.

Auto traffic to the monument is steadily increasing. After the improvement of roads is effected the Petrified Forests of Arizona will be among the easily accessible points of interest in the Southwest, and their scenic and geologic wonders justify an ever-increasing attendance of visitors.

CASA GRANDE NATIONAL MONUMENT.

FRANK PINKLEY, Custodian, Blackwater, Ariz.

The Casa Grande Ruin Reservation consists of 480 acres of land lying in the south-central part of Arizona at an altitude of 1,422 feet and is a typical spot of desert scenery, being level ground covered with a growth of mesquite, creosote bush, and salt bush or so-called sage brush.

The reservation was set aside by Executive order dated June 22, 1892, under the act approved March 2, 1889 (25 Stat., 961). The boundaries of the reservation were changed, without changing the area, by presidential proclamation of December 10, 1909. On August 3, 1918, by presidential proclamation, the reservation was made a national monument under authority of the act of Congress approved June 8, 1906 (34 Stat., 225), and placed under the jurisdiction of the National Park Service created by the act of Congress approved August 25, 1916 (39 Stat., 535). A resident custodian was appointed for the first time in the latter part of 1901. During the year ending June 30, 1918, a change of custodians was made, effective April 1, Mr. Frank Pinkley being appointed vice Mr. James P. Bates.

The date of the civilization which built the ruins throughout the Gila River and Salt River valleys, of which the Casa Grande is the only remaining example, is not known. Conservative estimates place the age of the Casa Grande, or Great House, at from 5 to 800 years. This particular building to which most of the historic interest attaches was about 40 by 60 feet square and four stories high. It is a part of a walled village somewhat less than 3 acres in area in which we have so far identified a ground plan of 44 rooms. The wall surrounding this village unit, which is called Compound A to distinguish it from other similar units in the immediate vicinity, was nearly 11 feet high. Other villages on the reservation which have so far been investigated and partially or completely excavated, are called Compounds B, C, D, and E, and Clan House 1. Many mounds remain untouched and the matter of opening all of them would occupy many years.

Race evolution as determined by environment is an interesting line of study here and the various steps in development are shown to visitors. The ancient people must have settled in the valley, few in numbers, gathering close to the river, where they could take out small ditches and irrigate the alluvial soil with the least possible labor. Gradually, as their population increased, they went farther and farther out on the higher ground, taking out one high-line ditch after another until the group of buildings of which the Casa Grande is a part was built. It is a comparatively recent group in the race life in the valley and we might say that if the Casa Grande itself is 5 to 800 years old, the oldest of the group of units around it may date back to between eight and twelve hundred years, and the oldest settlements in the valley must have been made several centuries before that.

The evolution of architecture can be traced from the mud-plastered brush wall through a reinforced type of thick Caliche wall, containing upright juniper timbers 2 inches or more in diameter, which must have been transported 50 miles or more, to a solid type of wall which in extreme cases was made 4 feet 2 inches thick.

The people were well adapted to their environment for they lived for many, many generations entirely self-sustaining in a country where, if the imports were cut off, the present population would be driven out in a very few years.

They seem to have lived in a true stone age, no metal implements having yet been discovered which can be attributed to them. They had an architecture well adapted to the climate and country, had well-developed canal systems, and practiced agriculture on a fairly large scale. They visited the country around them in all directions for from 1 to 200 miles.

Like all desert races they were probably well acquainted with the stars and an interesting theory has been built on a system of holes penetrating the east walls of the Casa Grande that they used the sunrise on two mornings of the year to date their ceremonial and festival days so that their calendar would remain accurate century after century. They made pottery, wove baskets and cloth, made stone tools and grinding mills, and made jewelry for personal adornment from shells brought from the salt water and semiprecious stones brought from the mountains.

The visitor to this reservation, aside from gaining an idea of a people who by adapting themselves to their environment built up a thriving population and existed for centuries under what seem to-day almost impossible conditions, will take away some accurate impressions of a typical section of the southwestern desert. At present the tourist stopping over in Tucson or Phoenix can have splendid hotel service and is able to make the round trip to the Casa Grande by motor in a day, the ride being made across the floor of the desert which is dotted with mountain chains. It is an ideal trip for fall, winter, or spring months and is very interesting to the stranger from the point of desert vegetation and desert life. It is estimated that there were 3,150 visitors to the reservation during the past season.

Since 1907–8, when the last appropriation was obtained for excavation by direct action of Congress, no funds have been available for excavation or repair work, and the only money expended aside from the custodian's salary was for some minor repairs on the house and the installation of a tank and pump at the well. No funds have been available so there have been no expenditures during the year ending June 30, 1918.

Since the change in the custodianship plans have been outlined looking to the betterment of conditions from the visitors' standpoint, and we hope during the next year to do some cleaning up, grading, and some inexpensive repair work, all looking to the preservation and care of the ancient buildings; to get up signs on the desert roads, so that visitors may easily find their way; to provide pleasant parking places for automobile parties; and to provide a rest house for the convenience and comfort of visitors. We will also try to gather a library along the lines of archaeology, ethnology, and the early history of the Southwest, so that the interested visitor may find the data at hand for extending his investigations should he consider it worth while.

We plan later to fence the reservation and develop a water supply sufficient to irrigate part of the grounds so we may lay out a parking scheme. The visitor, after a 75-mile motor trip across the desert, would welcome the cool shade of large trees and the pleasant green of grassy parking grounds.

A good contour map of the reservation should be prepared and a final plan of the location of houses, outbuildings, and grounds should be laid out by a competent architect and landscape gardener, so that every improvement we may make, however small, might take its place in the complete plan.

ZION NATIONAL MONUMENT.

WALTER RUESCH, Custodian, Springdale, Utah.

The active service of the custodian of the monument dates from the 12th of August, 1918, hence a very full report of the conditions for the past year can not be expected.

The climate of this locality is so mild that tourists were visting the monument all winter. At least 100 cars, averaging three tourists each, visited the monument between the closing of the Wylie Camp, October 28, 1917, and the opening of the camp, June 8, 1918.

This season up to October 12, 469 visitors registered in the monument. Tourist travel was limited for the following reasons: First, due to war conditions, the Government Railroad Administration prevented the Los Angeles & Salt Lake Railroad, which fosters this enterprise, from advertising or encouraging tourist travel. This has reduced the patronage of the resort to persons traveling with their own cars. Second, the condition of the roads has not been encouraging. The road to the monument is new, the reservation being 30 miles off the automobile highway known as the Arrowhead Trail. An unusual amount of rain this season has added to the hindrance of travel. The roads will be better in the future because of age and the settling of the roadbed and the assurance of repair and new work.

The Government road within the monument is in excellent condition. Sufficient money has been available the present season to permit of surfacing the sandy portions of the road with hard material. Favorable comment is made by all visitors since this has been done.

The Wylie Camp is equipped for the comfortable care of a much larger patronage than has yet been afforded it. Guests are unanimous in their praise of the treatment and accommodations given them.

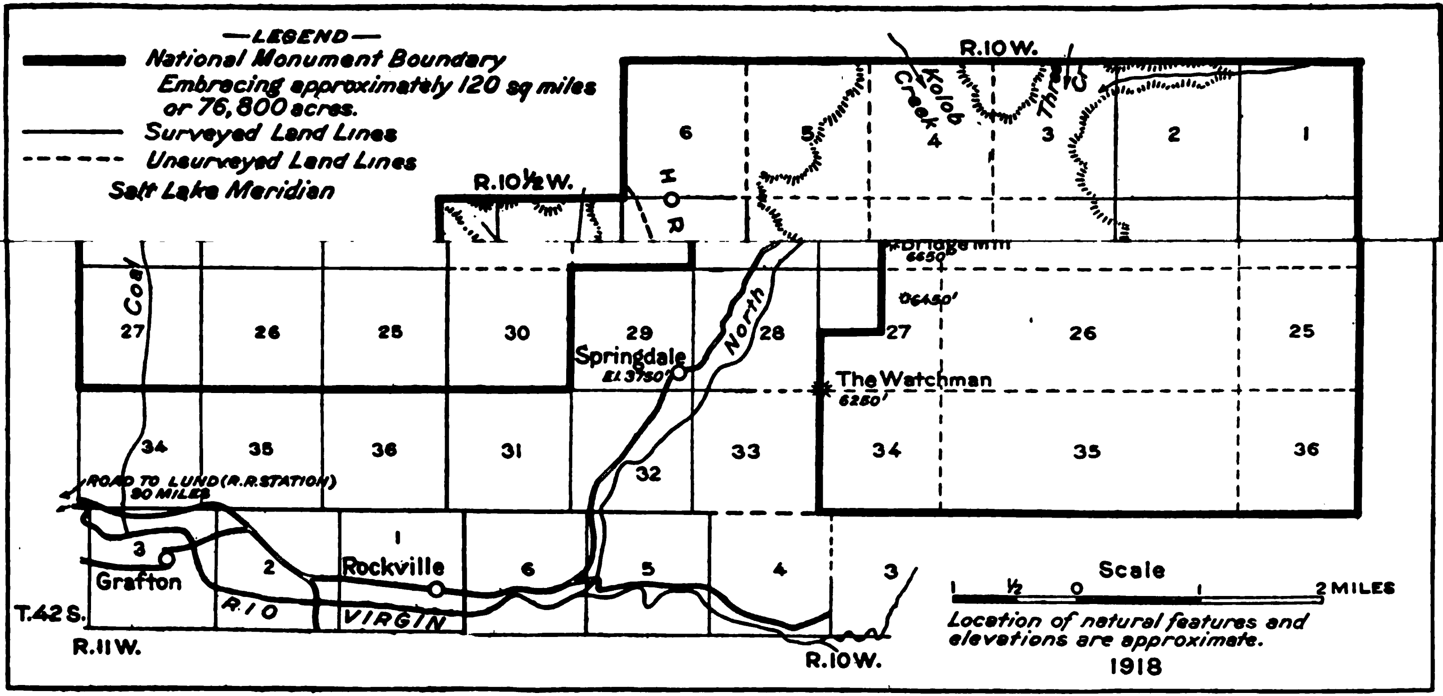
SCENIC BEAUTY OF THE MONUMENT.

All visitors are profuse in their praise of the beauties of the scenery of the canyon. Very favorable comparison is made with other national resorts.

The shutting out of all stock from grazing or ranging in the monument the present season has added to the beauty of the resort. A very marked change in the appearance of the foliage is manifest to all.

GAME OR WILD ANIMALS.

Deer have been frequently seen in the valley this summer, and we believe that the increase in vegetation, the absence of domestic animals, and the prevention of the use



MAP OF ZION NATIONAL MONUMENT.

TRAILS TO RIM OF CANYON.

When trails are completed to the east and west rims of the canyon, so that tourists may be able to view the wonderful walls from the top, great interest will be added to the visitors' stay in the monument. Such trails will be perfected in the near future. One already is in use to the summit of east wall.

AS A REST RESORT.

The excellent medicinal water with which the camp is supplied and the wonderfully quiet, restful atmosphere of the locality is going to make this a haven for persons afflicted with nervous troubles and for persons needing rest from any cause. May 1 and November 15 should mark the limit of the weather conditions ideal for recreation in this resort.

CAMPERS WITH THEIR OWN OUTFITS.

Because of the soft, sandy soil everywhere present in the canyon, there should be grounds prepared by surfacing with hard material as camp sites for persons carrying their own camping equipment. This we hope to see accomplished before long.

DISTANCE FROM RAILROAD.

From Lund, the nearest station on the Salt Lake Route Railroad, to the Wylie Camp is 100 miles. This is covered by the stages of the National Park Transportation & Camping Co. in eight hours, including a stop at Cedar City en route for lunch. The auto-stage service is first class.

CLIFF DWELLINGS.

A horseback trip of one day takes visitors from the Wylie Camp to an ancient cliff-dwelling ruin located up the south branch of the Virgin River—the Paranuweap.

There are six rooms in this group. Many go to this interesting relic of a long-ago, little-known race of American inhabitants.

THE FENCE AT ENTRANCE.

Since the erection of the fence at entrance to the canyon there has been little trouble with stock, which had hitherto roamed at will in the monument. It is gratifying to notice with what cheerful willingness the owners of stock have conformed to these regulations. Near-by residents who formerly not only used the canyon for grazing but also for farming purposes have shown a commendable pride in doing all in their power to assist making Zion Canyon a popular and attractive tourist resort.

APPENDIX C.

STATISTICS.

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Visitors to the national parks, 1905-1918 1004

Automobile and motorcycle licenses issued during seasons 1914-1918 1005

Receipts collected from automobiles and motorcycles during seasons 1914-1918 1005

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National park and monument areas administered by the National Park Service in relation to the States and Territories in which they are located 1006

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National park and monument areas administered by the National Park Service in relation to the national forests, including national monuments, administered by the Forest Service 1007

Statement of appropriations made for and received revenues from the various national parks and national monuments, and expenditures made therefrom during the fiscal years 1904-1918, inclusive; also appropriations for the fiscal year 1919 1007

Graphic Chart:

Fig. 5.—All national parks, appropriations, revenues, and visitors 1011

Detailed statement of appropriations for the national parks and monuments... 1011

STATISTICS.

Visitors to parks, 1905–1918.

Name of park.	1905	1906	1907	1908	1909	1910	1911	1912	1913	1914	1915	1916	1917	1918
Hot Springs Reservation	[2] 109,000	(1)	(1)	(1)	(1)	[2] 120,000	[2] 130,000	[2] 135,000	[2] 135,000	[2] 125,000	[2] 115,000	[2] 118,740	[2] 135,000	[2] 140,000
Yellowstone National Park	26,188	17,182	16,414	19,542	32,545	19,575	23,054	22,970	24,929	20,250	51,895	35,849	35,400	21,275
Casa Grande Ruin[3]	(1)	(1)	(1)	(1)	(1)	(1)	[2] 450	[2] 450	[2] 450	[2] 500	[2] 500	1,909	2,437	[2] 3,150
Sequoia National Park	(1)	[2] 700	[2] 900	1,251	854	2,407	3,114	2,923	3,823	4,667	7,647	10,780	18,510	15,001
Yosemite National Park	(1)	5,414	7,102	8,850	13,182	13,619	12,530	10,884	13,735	15,145	33,452	33,390	34,510	33,527
General Grant National Park	[2] 1,000	[2] 900	[2] 1,100	1,773	798	1,178	2,160	2,240	2,756	3,735	10,523	15,360	17,390	15,496
Mount Rainier National Park	928	1,786	2,068	2,826	5,968	8,000	10,306	8,946	13,501	15,038	35,166	23,989	35,568	43,901
Crater Lake National Park	[2] 1,400	[2] 1,800	[2] 2,600	5,275	4,171	[2] 5,000	[2] 4,500	5,235	6,253	7,096	11,371	12,265	11,645	13,231
Wind Cave National Park	2,438	2,787	2,751	3,171	3,216	3,387	3,887	3,199	3,988	3,592	2,817	[2] 9,000	16,742	14,431
Platt National Park	(1)	(1)	[2] 28,000	[2] 26,000	[2] 25,000	[2] 25,000	[2] 30,000	[2] 31,000	[2] 35,000	[2] 30,000	[2] 20,000	[2] 30,000	[2] 35,000	[2] 36,000
Sullys Hill Park	(1)	(1)	[2] 400	[2] 250	[2] 190	[2] 190	[2] 200	[2] 200	[2] 300	[2] 500	[2] 1,000	[2] 1,500	2,207	4,188
Mesa Verde National Park		(1)	(1)	[2] 80	165	250	206	230	280	502	663	1,385	2,223	2,058
Glacier National Park							[2] 4,000	6,257	12,138	14,168	14,265	12,839	18,387	9,086
Rocky Mountain National Park											[2] 31,000	[2] 51,000	[2] 117,186	[2] 101,497
Hawaii National Park												(1)	(1)	(1)
Lassen Volcanic National Park												(1)	[2] 8,500	[2] 2,000
Mount McKinley National Park													(1)	(1)
Total	140,954	30,569	61,335	69,018	86,089	198,606	224,407	229,534	252,153	240,193	335,299	358,006	490,705	454,841

[1] No record.

[2] Estimated.

[3] By Presidential proclamation, Aug. 3, 1918, made a national monument.

Automobile and motorcycle licenses issued during seasons, 1914–1918.[1]

Name of park.[2]	1914		1915		1916		1917		1918[3]	
	Automobiles.	Motorcycles.	Automobiles.	Motorcycles.	Automobiles.	Motor cycles.	Automobiles.	Motorcycles	Automobiles.	Motorcycles.
Yellowstone[4]	....	....	958	....	3,430	....	5,326	....	4,447	16
Sequoia[5]	164	....	343	11	731	4	952	....	766	2
Yosemite	871	....	3,901	....	3,932	....	5,320	....	5,554	50
General Grant	409	12	1,604	40	1,730	41	2,267	....	2,350	27
Mount Rainier	1,597	204	3,235	247	2,973	99	5,906	108	7,353	122
Crater Lake	1,117	18	2,015	31	2,051	29	2,094	15	1,959	5
Mesa Verde	30	4	86	....	178	2	368	....	338	....
Glacier	267	4	467	16	511	11	1,292	....	1,011	1
Total	4,455	242	12,609	345	15,536	186	23,525	123	23,778	232

[1] All parks opened to motorcycles season of 1918.

[2] No licenses required for Wind Cave, Hot Springs, Platt, Hawaii, Lassen Volcanic, Sullys Hill, and Rocky Mountain National Parks. No roads in Mount McKinley Park.

[3] Number of licenses formally reported to Washington, to and including Oct 10, 1918.

[4] Opened to automobiles Aug. 1, 1915.

[5] License required only for Giant Forest Road.

Licenses not required in certain parks because of small road mileage or unimproved condition of roads (see footnote 2) Licenses also not required for travel on unimproved roads in other parks. No license required for operating cars on official business

Receipts collected from automobiles and motorcycles during seasons, 1914–1918.

Name of park.[1]	1914[2]	1915[2]	1916[2]	1917[1]	1918[4]
Yellowstone[5]	....	$7,076.57	$25,387.50	$39,945.00	$33,392.50
Sequoia[6]	$817.61	1,183.56	1,600.00	2,380.00	1,920.00
Yosemite	4,033.45	13,457.71	19,885.00	26,600.00	27,888.00
General Grant	445.89	1,685.50	[7] 957.50	1,133.50	1,188.50
Mount Rainier	8,147.95	16,371.61	13,194.00	[8] 14,181.50	[9] 18,225.50
Crater Lake	1,167.00	2,102.00	4,402.00	5,253.00	4,902.50
Mesa Verde	38.52	85.07	95.50	184.00	338.00
Glacier	342.52	573.99	312.00	1,292.00	1,012.00
Total	14,992.94	42,536.11	65,833.50	90,969.00	88,867.00

[1] No license required for Wind Cave Hot Springs, Platt, Hawaii, Lassen Volcanic, Sullys Hill, and Rocky Mountain National Parks. No roads in Mount McKinley Park.

[2] Two forms of permit, single trip and season.

[3] By regulation of May 1, 1917, single-trip license abolished and all permits made good for entire season.

[4] Received in Washington, to and including Oct. 10, 1918.

[5] Opened to automobiles Aug. 1, 1915.

[6] License required only for Giant Forest Road.

[7] Automobile single-trip fee reduced by regulation, Mar. 1, 1916, from $1 to 50 cents, season permit from $5 to $2.50.

[8] Automobile single-trip and season permit fee reduced by regulation May 1, 1917, from $4 and $6, respectively, to $2.50.

[9] By regulation May 1, 1918, single-trip permit reestablished in this park only; fee, $1.

Private automobiles entering the national parks during seasons, 1916–1918.

Name of park.	1916	1917	1918[1]	Name of park.	1916	1917	1918[1]
Yellowstone	3,445	5,703	4,734	Wind Cave[3]	[5] 2,500	4,837	4,815
Casa Grande Ruin[2]	[5] 470	604	[5] 630	Mesa Verde	185	364	371
Sequoia[4]	736	2,334	1,627	Glacier	902	1,121	1,065
Yosemite	4,043	6,521	7,621	Rocky Mountain[3]	[5] 10,050	[5] 23,004	[5] 20,588
General Grant	1,778	2,158	2,438				
Mount Rainier	3,070	5,894	7,602	Total	29,828	55,296	54,596
Crater Lake	2,649	2,756	3,105				

[1] Automobiles entering parks with or without licenses, to and including Oct. 12, 1918.

[2] By Presidential proclamation, Aug. 3, 1918, made a national monument. No license required.

[3] No license required.

[4] License required only for Giant Forest Road.

[5] Estimated.

National park and monument areas administered by the National Park Service in relation to the States and Territories in which they are located.

State or Territory.	Area.	Parks and monuments.	Relation.
	Acres.	*Acres.*	*Per cent.*
Alaska	378,165,760	2,496,057	0.66
Arizona	72,838,400	28,685	.04
Arkansas	34,134,400	912	.003
California	99,617,280	941,896	.94
Colorado	66,341,120	295,490	.44
Hawaii	[1] 3,160,320	34,295	1.08
Idaho	53,346,560	23,040	.04
Maine	21,145,600	5,000	.02
Montana	93,568,640	1,091,880	1.16
New Mexico	78,485,760	21,710	.03
North Dakota	44,917,120	1,083	.002
Oklahoma	44,836,480	848	.002
Oregon	61,188,480	156,902	.25
South Dakota	49,673,600	10,899	.02
Utah	52,597,760	79,780	.15
Washington	42,775,040	171,792	.40
Wyoming	62,460,160	1,994,322	3.17

[1] Area of the Islands of Hawaii and Maui on which are located the Hawaii National Park.

National park and monument areas administered by the National Park Service in relation to the public lands.[1]

State or Territory.	Public lands.[2]	Parks and monuments.[2]	Relation.
	Acres.	*Acres.*	*Per cent*
Alabama	48,875	....	....
Alaska	354,281,760	2,496,057	0.70
Arizona	33,050,236	28,685	.08
Arkansas	1,207,974	912	.07
California	40,365,971	941,896	2.33
Colorado	23,922,389	295,490	1.23
Florida	422,944	....	....
Hawaii [3]	1,643,918	34,295	2.08
Idaho	31,032,686	23,040	.07
Kansas	5,275	....	....
Louisiana	45,569	....	....
Maine	....	5,000	....
Michigan	162,295	....	....
Minnesota	1,514,052	....	....
Mississippi	42,064	....	....
Missouri	147	....	....
Montana	25,309,087	1,091,880	4.31
Nebraska	314,500	....	....
Nevada	60,342,881	....	....
New Mexico	27,471,201	21,710	.07
North Dakota	117,171	1,083	.92
Oklahoma	94,043	848	.90
Oregon	27,599,628	156,902	.57
South Dakota	1,949,611	10,899	.55
Utah	38,959,214	79,780	.20
Washington	11,374,736	171,792	1.51
Wisconsin	6,146	....	....
Wyoming	35,806,461	1,994,322	5.56
Total	717,090,769	7,354,540	1.03

[1] Includes vacant public lands, national parks and monuments, and national forests, but does not include military and Indian reservations, reclamation and power site withdrawals, etc.

[2] July 1, 1918, with the exception of those in the Territory of Hawaii which are as of July 1, 1917, 1918 figures not being available.

[3] Public lands of the Territory of Hawaii are under the territorial land department.

National park and monument areas administered by the National Park Service in relation to the national forests, including national monuments administered by the Forest Service.

State or Territory.	National forests.[1]	Parks and monuments.[1]	Relation.
	Acres.	*Acres.*	*Per cent.*
Alabama	[2] 27,745		
Alaska	20,868,259	2,496,057	11.96
Arizona	11,765,541	28,685	.24
Arkansas	918,586	912	.09
California	18,895,042	941,896	4.98
Colorado	13,354,944	295,490	2.21
Florida	308,268		
Georgia	[3] 95,970		
Hawaii		34,295	
Idaho	17,686,930	23,040	.13
Maine	24,994	[4] 5,000	20.00
Michigan	89,466		
Minnesota	1,044,079		
Montana	16,016,138	1,091,880	6.81
Nebraska	205,944		
Nevada	5,260,681		
New Hampshire	[3] 275,969		
New Mexico	8,333,937	21,710	.25
North Carolina	[3] 223,759		
North Dakota		1,033	
Oklahoma	61,480	848	1.37
Oregon	13,117,130	156,902	1.19
Porto Rico	12,443		
South Carolina	[3] 17,381		
South Dakota	1,101,486	10,899	.93
Tennessee	[3] 144,124		
Utah	7,403,515	79,780	1.07
Virginia	[3] 233,658		
Washington	9,942,961	171,792	1.72
West Virginia	[3] 89,193		
Wyoming	8,377,945	1,994,322	23.80
Total	155,897,568	7,354,540	4.71

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[1] July 1, 1918.

[2] 13,655 acres of United States public lands and 14,090 acres of lands purchased under Weeks Act.

[3] Purchased under the Weeks Act.

[4] Donated to the United States. Other donations of lands in national monuments areas amount to 455 acres.

Statement of appropriations made for, and received revenues from, the various national parks and national monuments, and expenditures made therefrom during the fiscal years 1904–1918, inclusive; also appropriations for the fiscal year 1919.

Name of the national park.	Appropriations.		Revenues.	
	Appropriated.	Expended.	Received.	Expended.
Hot Springs Reservation:				
1904	$36,050.00	(1)	$18,430.00	(1)
1905	8,000.00	(1)	19,330.00	(1)
1906	6,000.00	(1)	19,748.33	(1)
1907			20,165.00	$19,938.41
1908			28,090.00	21,115.56
1909			34,475.00	19,699.27
1910			36,540.00	28,401.97
1911	2,935.00	$2,935.00	36,060.00	56,375.33
			[2] 82,518.00	
1912			35,279.16	3,267.96
				[3] 42,957.18
1913			40,711.00	[4] 29,438.25
				[3] 34,581.57
			[5] 1,287.90	[5] 1,273.70

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[1] Figures not available.

[2] Proceeds from sale of Government lots (lot fund).

[3] Expenditure from lot fund.

[4] Includes $1,272.71 expended in making survey and preparation of plans, etc., for sewer system, city of Hot Springs.

[5] Contributed by city of Hot Springs on account of sewer system, $14.20 returned to city.

Statement of appropriations made for, and received revenues from, the various national parks and national monuments, etc.—Continued.

Name of the national park.	Appropriations.		Revenues.	
	Appropriated.	Expended.	Received.	Expended.
Hot Springs Reservation—Continued.				
1914			$38,380.00	[1] $36,658.42
1915			37,877.66	35,941.96
1916			37,926.32	40,361.14
1917			35,611.75	31,302.98
1918			28,883.44	42,822.02
1919	$140,000.00			
Yellowstone:				
1904	8,940.30	(2)		
1905	7,500.00	(2)		
1906	7,500.00	(2)	1,822.50	(2)
1907	7,500.00	7,498.64	1,838.96	2,647.04
1908	8,000.00	7,999.40	4,699.65	4,228.37
1909	[3] 8,000.00 [4] 2,500.00	7,997.44 1,962.53	4,790.20	3,661.47
1910	8,000.00	7,999.71	5,110.06	3,369.80
1911	8,500.00	8,499.96	23,420.13	7,998.47
1912	8,500.00	8,500.00	16,476.38	8,108.41
1913	8,500.00	8,500.00	21,980.10	6,449.97
1914	8,500.00	8,500.00	15,439.23	13,843.24
1915	8,500.00	8,500.00	20,307.40	12,884.18
1916	8,500.00	8,491.41	46,628.49	26,350.96
1917	8,500.00	8,500.00	54,796.69	53,773.61
1918	10,500.00	8,131.29	71,393.56	76,214.15
1919	334,920.00			
Sequoia:				
1904	10,089.69	(2)		
1905	10,000.00	(2)		
1906	10,000.00	(2)		
1907	10,000.00	9,919.82	150.50	
1908	15,550.00	15,333.50	43.15	18.97
1909	15,550.00	15,373.96	46.57	
1910	15,550.00	15,514.19	121.78	
1911	15,550.00	15,543.34	255.65	31.25
1912	15,550.00	15,549.20	305.16	48.25
1913	15,550.00	15,549.52	353.85	70.81
1914	15,550.00	15,549.27	4,094.21	83.94
1915	15,550.00	15,549.65	1,975.03	3,498.23
1916	15,550.00	15,549.75	5,169.86	4,740.75
1917	22,300.00 [5] 50,000.00	15,605.28 50,000.00	10,326.60	415.04
1918	25,000.00	24,553.87	13,402.53	25,393.66
1919	30,510.00			
Yosemite:				
1904	6,000.00	(2)		
1905	8,400.00	(2)		
1906	25,400.00	(2)	1,000.00	
1907	5,750.00	5,705.24	9,193.04	1,000.00
1908	30,000.00	29,508.58	14,390.06	7,131.37
1909	30,000.00	29,969.86	15,851.17	5,024.84
1910	30,000.00	29,983.82	21,373.18	34,496.09
1911	62,000.00 [6] 12,000.00	62,000.00 [6] 11,646.37	35,765.48	19,050.39
1912	50,000.00	49,999.68	23,855.77	35,970.66
1913	80,000.00	80,000.00	19,495.83	16,431.16
1914	125,000.00	124,798.49	23,406.14	9,903.58
1915	100,000.00	99,235.22	37,019.20	40,699.30
1916	75,000.00	74,996.88	49,878.42	52,961.53
1916 (deficiency)	196.80	196.80		
1917	250,000.00	249,987.45	53,500.66	55,098.45
1918	235,000.00	225,503.94	65,865.65	81,949.93
1919	255,000.00			
General Grant:				
1904	2,058.65	(2)		
1905	2,000.00	(2)		
1906	2,000.00	(2)		
1907	2,000.00	1,988.75		
1908	2,000.00	1,914.76	63.75	
1909	2,000.00	1,999.93		

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[1] Includes 99 cents expended on account of survey sewer system.

[2] Figures not available.

[3] Administration and protection.

[4] Marking unmonumented portions of park boundaries

[5] For purchase of private holdings.

[6] Appropriations without year, for examination of water supply for city of San Francisco.

Statement of appropriations made for, and received revenues from, the various national parks and national monuments, etc.—Continued.

Name of the national park.	Appropriations.		Revenues.	
	Appropriated	Expended.	Received.	Expended.
General Grant—Continued.				
1910	$2,000.00	$1,999.90	$50.00	
1911	2,000.00	1,999.89	210.64	$18.88
1912	2,000.00	1,998.60	173.54	.99
1913	2,000.00	1,999.20	158.68	508.01
1914	2,000.00	2,000.00	429.64	1.59
1915	2,000.00	2,000.00	560.89	355.68
1916	2,000.00	1,999.36	1,795.50	481.46
1917	2,000.00	1,999.55	1,153.78	536.97
1918	2,000.00	1,999.97	1,801.63	3,943.96
1919	4,500.00			
Mount Rainier:				
1907	[1] 2,500.00	2,407.91	205.22	
1908	3,000.00	2,965.59	170.00	8.96
1909	3,000.00	2,961.61	1,104.79	27.65
1910	3,000.00	3,000.00	9,053.79	2,763.86
1911	3,000.00	2,998.90	7,748.48	5,342.47
1912	5,400.00	5,399.99	5,370.36	9,363.83
1913	20,000.00	19,989.70	7,301.62	6,791.80
1914	23,400.00	23,347.05	9,040.10	6,039.42
1915	51,000.00	50,907.79	12,893.29	5,513.46
1916	30,000.00	30,000.00	19,317.99	15,026.08
1917	30,000.00	29,999.19	14,346.80	17,617.04
1918	75,000.00	74,848.78	17,241.25	34,618.77
1919	24,600.00			
Crater Lake:				
1904	2,000.00	(2)		
1905	3,000.00	(2)		
1906	3,000.00	(2)		
1907	3,000.00	2,989.75	10.00	(3)
1908	7,315.00	7,314.65		
1909	3,000.00	2,999.21	15.00	
1910	3,000.00	2,999.97	11.00	
1911	3,000.00	2,999.77	30.00	
1912	3,000.00	2,998.75	323.00	
1913	3,000.00	2,978.41	784.18	
1914	7,540.00	7,483.61	793.00	
1915	8,040.00	7,884.59	1,359.50	
1916	8,000.00	7,986.84	2,402.04	
1917	8,000.00	7,952.88	4,565.25	
1918	15,000.00	14,823.46	5,505.72	
1919	13,225.00			
Wind Cave:				
1904	[4] 2,500.00	(2)		
1905	2,500.00	(2)		
1906	2,500.00	(2)		
1907	4,400.00	4,398.08		
1908	2,500.00	2,433.54	100.00	
1909	2,500.00	2,335.37	450.00	220.80
1910	2,500.00	2,500.00	523.25	62.88
1911	2,500.00	2,413.60	340.00	562.28
1912	2,500.00	2,499.86	675.00	278.56
1913			528.26	1,197.39
1914	2,500.00	2,500.00	246.17	366.72
1915	2,500.00	2,496.97	2,342.90	606.16
1916	2,500.00	2,497.82	2,590.89	981.57
1917	2,500.00	2,499.87	1,632.00	1,013.04
1918	2,500.00	2,498.40	4,082.60	7,848.66
1919	4,000.00			
Platt:				
1906	(5)		37,307.44	
1907			178.00	7,082.25
1908			7,021.00	10,552.26
1909			272.00	15,764.27
1910			164.50	11,734.74
1911	5,000.00	4,994.64	422.75	779.06
1912	10,000.00	9,999.34	165.50	219.04
1913	8,000.00 [6] 17,500.00	7,999.95 [6] 10,120.73	49.95 17,500.00	100.11 [6] 10,119.06

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[1] No appropriation made for Mount Rainier prior to 1907.

[2] Figures not available.

[3] Expenditure of revenues of Crater Lake Park for park purposes therein not authorized by statute.

[4] No appropriation made for the Wind Cave National Park prior to 1904.

[5] No appropriation for Platt Park prior to 1911 fiscal year. Land prior to creation of park included in Sulphur Springs Reservation.

[6] Construction sanitary sewer, like amount being contributed by the city of Sulphur, Okla.; $7,380.94 returned to city.

Statement of appropriations made for, and received revenues from, the various national parks and national monuments, etc.—Continued.

Name of the national park.	Appropriations.		Revenues.	
	Appropriated.	Expended.	Received.	Expended.
Platt—Continued.				
1914	$8,000.00	$7,988.56	$282.81	$87.48
1915	8,000.00	8,000.00	241.76	178.87
1916 (deficiency, $10,000)	18,000.00	16,974.49	301.11	44.35
1917	8,000.00	8,000.00	434.11	138.28
1918	7,180.00	7,179.84	1,010.40	1,690.91
1919	7,500.00			
Mesa Verde:				
1907-8	[1] 7,500.00	7,455.82		(2)
1909	7,500.00	7,348.33		
1910	7,500.00	7,443.09		
1910-11 (for examination of coal lands in park)	2,000.00	947.75		
1911	20,000.00	19,808.63	100.00	
1912	7,500.00	7,351.54	898.92	
1913	15,000.00	14,956.91	615.21	
1914	10,000.00	9,880.30	679.00	
1915	10,000.00	9,665.75	637.42	
1916	10,000.00	9,994.39	946.38	
1917	10,000.00	9,999.00	130.14	
1918	10,000.00	9,909.80	2,763.75	
1919	18,000.00			
Glacier:				
1911	[3] 15,000.00	14,998.59	326.88	
1912	69,200.00	69,117.94	1,490.94	
1913	75,000.00	74,568.24	4,677.14	428.54
1914	100,000.00	99,999.49	4,010.71	477.07
1915	75,000.00	74,994.27	4,218.51	9,735.44
1916	75,000.00	74,963.88	10,011.76	644.58
1917	110,000.00	108,148.16	3,202.40	1,352.73
1918	115,000.00	114,928.02	4,438.22	17,997.61
1919	80,000.00			
Rocky Mountain:				
1915	[4] 3,000.00	2,910.80		(5)
1916	8,000.00	7,992.84	501.93	
1917	10,000.00	9,964.24	871.27	
1918	10,000.00	9,892.26	598.75	
1919	10,000.00			
Hawaii:				
191	750.00			
Protection of national monument:				
1917	3,500.00	2,367.54		
1918	5,000.00	4,761.66	100.00	
1919	10,000.00			
Sullys Hill:				
1914	500.00			
Casa Grande National Monument: [6]				
1904	100.00			
1905	900.00			
1906	900.00			
1907	900.00			
1908	900.00			
1909	900.00			
1910	900.00			
1911	900.00			
1912	900.00			
1913	900.00			
1914	900.00			
1915	900.00			
1916	900.00			
1917	900.00			
1918	900.00			
1919	900.00			
Under the Smithsonian Institution:				
1907	3,000.00			
1908	3,000.00			
Improvement of Zion National Monument, Utah: 1917	15,000.00	14,963.81		
Improvement of Navajo National Monument, Ariz: 1917	[7] 3,000.00	1,962.69		
Protection and improvement of Sieur de Monts National Monument: 1919	10,000.00			

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[1] No appropriation made for the Mesa Verde National Park prior to 1907.

[2] Expenditure of revenues of Mesa Verde Park for park purposes therein not authorized by statute.

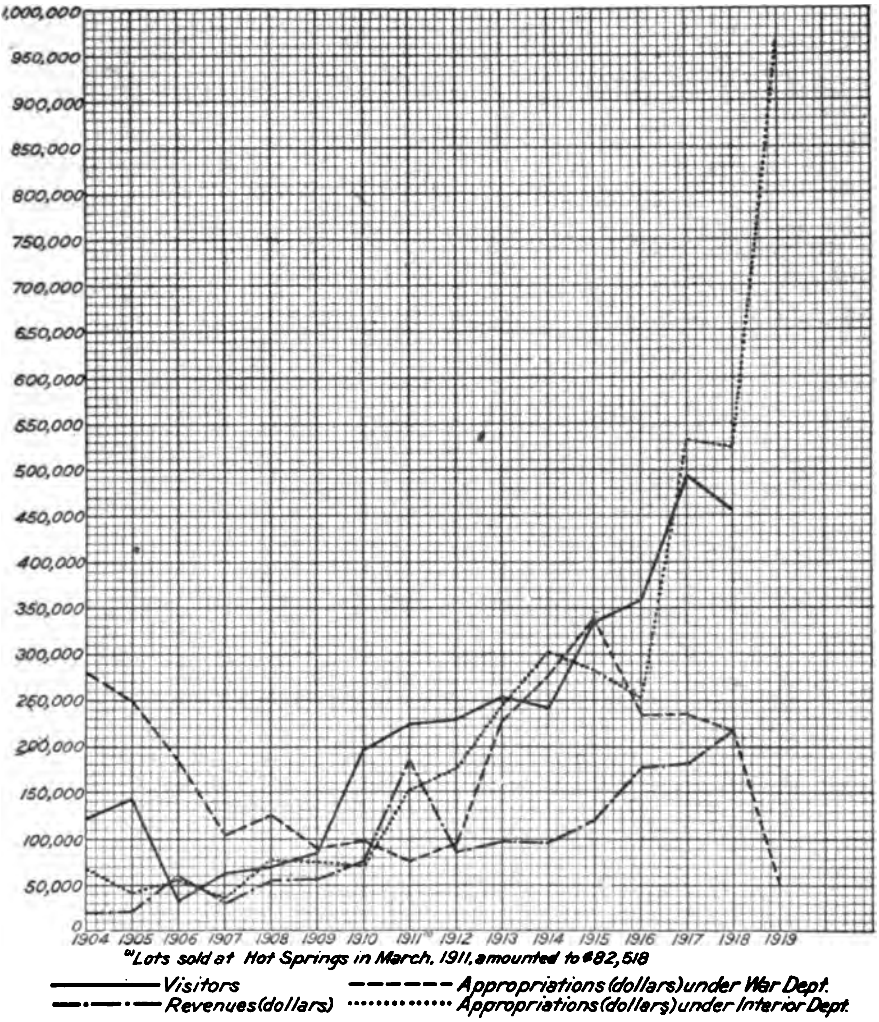
[3] No appropriation made for the Glacier National Park prior to 1911.

[4] No appropriation made for the Rocky Mountain National Park prior to 1915.

[5] Expenditure of revenues from Rocky Mountain Park for park purposes therein not authorized by statute.

[6] Expended under the direction of the Commissioner of the General Land Office, excepting $6,000 as noted under the Smithsonian Institution.

[7] Expended under direction of Smithsonian Institution.



[a] Lots sold at Hot Springs in March, 1911, amounted to $82,518

FIG. 5.—All national parks, appropriations, revenues, and visitors.

DETAILED STATEMENT OF APPROPRIATIONS FOR NATIONAL PARKS AND NATIONAL MONUMENTS UNDER THE JURISDICTION OF THE SECRETARY OF THE INTERIOR, 1879–1919, INCLUSIVE.

NATIONAL PARK SERVICE.[1]

1917. National Park Service in the District of Columbia, deficiency act of Apr. 17, 1917 (40 Stats., 2, 20)	$3,666.67
1918. National Park Service in the District of Columbia, sundry civil act of June 12, 1917 (40 Stats., 105, 151)	17,600.00
1919. National Park Service in the District of Columbia, sundry civil act of July 1, 1918 (Public No. 181, 65th Cong.)	19,200.00
Total	40,466.67

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[1] Established by act of Aug. 25, 1916 (39 Stats., 535).

YELLOWSTONE NATIONAL PARK, WYO.[1]

UNDER INTERIOR DEPARTMENT.

[From Mar. 1, 1872, to June 20, 1878, no annual appropriations for the park were made by Congress. See below for some of the expenses for such period paid by later appropriation acts.]

1879.	Protection and improvement of the park, sundry civil act of June 20, 1878 (20 Stats., 229)	$10,000.00
1880.	Protection and improvement of the park, sundry civil act of Mar. 3, 1879 (20 Stats., 393)	10,000.00
1881.	Protection and improvement of the park, sundry civil act of June 16, 1880 (21 Stats., 273)	15,000.00
1882.	Protection and improvement of the park, sundry civil act of Mar. 3, 1881 (21 Stats., 451)	15,000.00
1880.	For deficiency on account of protection and improvement, fiscal year 1880, deficiency act of Mar. 3, 1881 (21 Stats., 421)	89.76
1883.	Protection and improvement of the park, sundry civil act of Aug. 7, 1882 (22 Stats., 329)	15,000.00
1879.[2]	Protection and improvement of the park, deficiency act of Aug. 5, 1882 (22 Stats., 276)	150.00
1877-78.	For salary and expenses of Supt. Norris from Apr. 18, 1877, to June 30, 1878, sundry civil act of Aug. 7, 1882 (22 Stats., 329)	3,180.41
1884.	Protection and improvement, including salary of superintendent, $2,000, and 10 assistants at $900 each, sundry civil act of Mar. 3, 1883 (22 Stats., 626)	40,000.00
1885.	Protection and improvement of the park, including salaries, sundry civil act of July 7, 1884 (23 Stats., 211)	40,000.00
1886.	Protection and improvement of the park, including salaries sundry civil act of Mar. 3, 1885 (23 Stats., 499)	40,000.00
1886.	Continuation of compensation, superintendent and employees, July 1 to 15, 1886, joint resolutions of July 1 and 15, 1886 (24 Stats., 343 and 345)	934.25
	Reimbursement for expense of quarters of late Supt. Conger, deficiency act of Sept. 30, 1890 (26 Stats., 523)	169.37
1887.	Protection and improvement of the park (construction of roads and bridges under direction engineer officer detailed by Secretary of War), sundry civil act of Aug. 4, 1886 (24 Stats., 240)	20,000.00
1894.	For office of United States commissioner and jail, act of May 7, 1894, to protect birds and punish crimes in the park (28 Stats., 75)	5,000.00
1895.	Reimbursement of United States commissioner the amount paid for completion office and jail buildings, sundry civil act of Mar. 2, 1895 (28 Stats., 945)	385.75
1902.	Repairs to United States commissioner's building, sundry civil act of Mar. 3, 1901 (31 Stats., 1162)	450.00
1902.[3]	Administration and protection, sundry civil act of Mar. 3, 1901 (31 Stats., 1169)	5,000.00
1902.[4]	Surveying northern and western boundaries, sundry civil act of Mar. 3, 1901 (31 Stats., 1160)	3,800.00
1903.[4]	Administration and protection, sundry civil act of June 28, 1902 (32 Stats., 456)	5,000.00
	Completion survey of eastern boundary, sundry civil act of June 28, 1902 (32 Stats., 456)	2,800.00
	For payment to E. F. Stahle for survey of western boundary, deficiency act of July 1, 1902 (32 Stats., 573)	13.99
	For payment to E. F. Stahle for additional allowance for surveying boundary, deficiency act of July 1, 1902 (32 Stats., 573)	313.71

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[1] Created by act of Mar. 1, 1872, secs. 2474 and 2475, Rev. Stats.

[2] And prior years.

[3] Protection and improvement appropriations for the years 1888 to 1901, inclusive, were expended by the War Department.

[4] Improvement appropriations of these years were expendable by the War Department.

1903.	Purchase of buffalo and providing corral and feed, deficiency act of July 1, 1902 (32 Stats., 574)	$15,000.00
	Payment to the State of Wyoming for protection of park in prior years, act of May 27, 1902 (32 Stats., 236)	7,780.44
1904.[1]	Administration and protection (including $2,500 for maintenance of buffalo), sundry civil act of Mar. 3, 1903 (32 Stats., 1119)	7,500.00
	Surveying boundaries, deficiency act of Feb. 8, 1904 (33 Stats, 32)	1,440.30
1905.[1]	Administration and protection (including $2,500 for maintenance of buffalo), sundry civil act for Apr. 28, 1904 (33 Stats., 487)	7,500.00
1906.[1]	Administration and protection (including $2,500 for maintenance of buffalo), sundry civil act of Mar. 3, 1905 (33 Stats., 1188)	7,500.00
1907.[1]	Administration and protection (including $2,500 for maintenance of buffalo), sundry civil act of June 30, 1906 (34 Stats., 729)	7,500.00
1908.[1]	Administration and protection (including $2,500 for maintenance of buffalo), sundry civil act of Mar. 4, 1907 (34 Stats., 1337)	8,000.00
1909.[1]	Administration and protection (including $2,500 for maintenance of buffalo, and $2,500 for surveying and marking unmonumented portions of park boundaries), sundry civil act of May 27, 1908 (35 Stats., 351)	10,500.00
1910.[1]	Administration and protection (including $2,500 for maintenance of buffalo), sundry civil act of Mar. 4, 1909 (35 Stats., 990)	8,000.00
1911.[1]	Administration and protection (including $3,000 for maintenance of buffalo), sundry civil act of June 25, 1910 (36 Stats., 745)	8,500.00
1912.[1]	Administration and protection (including $3,000 for maintenance of buffalo), sundry civil act of Mar. 4. 1911 (36 Stats., 1420)	8,500.00
1913.[1]	Administration and protection (including $3,000 for maintenance of buffalo), sundry civil act of Aug. 24, 1912 (37 Stats., 460)	8,500.00
1914.	Administration and protection (including $3,000 for maintenance of buffalo), sundry civil act of June 23, 1913 (38 Stats., 49)	8,500.00
1915.	Administration and protection (including $3,000 for maintenance of buffalo), sundry civil act of Aug. 1, 1914 (38 Stats., 648)	8,500.00
1916.	Administration and protection (including $3,000 for maintenance of buffalo), sundry civil act of Mar. 3, 1915 (38 Stats., 862)	8,500.00
1917.	Administration and protection (including $3,000 for maintenance of buffalo), sundry civil act of July 1, 1916 (39 Stats., 307)	8,500.00
1918.	Administration and protection (including $5,000 for maintenance of buffalo), sundry civil act of June 12, 1917 (40 Stats., 105, 151)	10,500.00
1919.	Administration, protection, maintenance, and improvement (including $15,000 for maintenance of roads leading to park gateways through forest reserves east and south, $25,000 for repair of damage caused by flood waters to road leading through east forest reserve and park to Lake Hotel, $15,400 for widening approach roads, and $50,000 for a new road around the Gardiner Slide), sundry civil act of July 1, 1918 (Public No. 181, 65th Cong.)	334,920.00
	Total	717,427.98

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[1] Improvement appropriations of these years were expendable by the War Department

UNDER WAR DEPARTMENT.

1888.	Protection and improvement, sundry civil act of Mar. 3, 1887 (24 Stats., 531)	$20,000.00
1889.	Protection and improvement of park, sundry civil act of Oct. 2, 1888 (25 Stats., 534)	25,000.00
1890.	Protection and improvement, sundry civil act of Mar. 2, 1889 (25 Stats., 967)	50,000.00
1891.	Protection and improvement, sundry civil act of Aug. 30, 1890 (26 Stats., 398)	75,000.00
1892.	Improvement of the park, sundry civil act of Mar. 3, 1891 (26 Stats., 977)	75,000.00
1893.	Improvement of the park, sundry civil act of Aug. 5, 1892 (27 Stats., 376)	45,000.00
1894.	Improvement of the park, sundry civil act of Mar. 3. 1893 (27 Stats., 598)	30,000.00
1895.	Improvement of the park, sundry civil act of Aug. 18, 1894 (28 Stats., 403)	30,000.00
1896.	Improvement and protection of the park, sundry civil act of Mar. 2, 1895 (28 Stats., 945)	30,000.00
1897.	Improvement and protection, sundry civil act of June 11, 1896 (29 Stats., 442)	35,000.00
	Improvement and protection, sundry civil act of June 4, 1897 (30 Stats., 43)	35,000.00
1898.	Improvements, deficiency act of June 8, 1896 (29 Stats., 284)	5,000.00
	Improvement of the park, deficiency act of July 19, 1897 (30 Stats., 143)	.78
1899.	Improvement and protection, sundry civil act of July 1, 1898 (30 Stats., 629)	40,000.00
	Improvements, deficiency act of July 7, 1898 (30 Stats., 667)	93.75
1900.	Improvement and protection, sundry civil act of Mar. 3, 1899 (30 Stats., 1105)	40,000.00
	Improvement of the park, deficiency act of Mar. 3, 1899 (30 Stats., 1226)	99.80
1901.	Improvement and protection, sundry civil act of June 6, 1900 (31 Stats., 624)	60,000.00
	Improvement, deficiency act of June 6, 1900 (31 Stats., 291)	6.95
	Improvement for 1898, deficiency act of June 6, 1900 (31 Stats., 291)	162.62
1902.	Improvement of the park, sundry civil act of Mar. 3, 1891 (31 Stats., 1169)	113,000.00
1903.	Improvement of the park, sundry civil act of June 28, 1902 (32 Stats., 466)	250,000.00
	Payment to Northern Pacific Ry. Co. for transportation of cast-iron pipe, deficiency act of Feb. 14, 1902 (32 Stats., 12)	31.96
1904.	Improvement of the park, sundry civil act of Mar. 3, 1903 (32 Stats., 1130)	250,000.00
1905.	Improvement of the park, sundry civil act of Apr. 28, 1904 (33 Stats., 498)	250,000.00
1906.	Improvement of the park, sundry civil act of Mar. 3, 1905 (33 Stats., 1198)	133,000.00
1907.	Maintenance and repair of improvements in park, sundry civil act of June 30, 1906 (34 Stats., 748)	55,000.00
1908.	Maintenance and repair of improvements in park, sundry civil act of Mar. 4, 1907 (34 Stats., 1349)	75,000.00
1909.	Maintenance and repair of improvements in park, sundry civil act of May 27, 1908 (35 Stats., 365)	65,000.00
1910.	Maintenance and repair of improvements in park, sundry civil act of Mar. 4, 1909 (35 Stats., 1005)	65,000.00
1911.	Maintenance and repair of improvements in park, sundry civil act of June 25, 1910 (36 Stats., 725)	75,000.00
1912.	Maintenance and repair of improvements in park, sundry civil act of Mar. 4, 1911 (36 Stats., 1402)	70,000.00
	Construction of chapel in park on or near military reservation Army appropriation act of Mar. 3, 1911 (36 Stats., 1050)	25,000.00

1913.	Maintenance and repair of improvements in park, sundry civil act of Aug. 24, 1912 (37 Stats., 442)	$100,000.00
	Widening and improving surface of roads for building bridges and culverts to make roads suitable and safe for animal-drawn and motor-propelled vehicles, sundry civil act of Aug. 24, 1912 (37 Stats., 442)	77,000.00
1914.	Maintenance and repair of improvements in park, sundry civil act of June 23, 1913 (38 Stats., 33)	125,000.00
	Widening and improving surface of roads, for building bridges and culverts to make roads suitable and safe for animal-drawn and motor-propelled vehicles, sundry civil act of June 23, 1913 (38 Stats., 33)	75,000.00
1915.	Maintenance and repair of improvements, sundry civil act of Aug. 1, 1914 (38 Stats., 632)	125,000.00
	Widening to not exceeding 18 feet, and improving surface of roads, and for building bridges and culverts in the park to make such roads suitable and safe for animal-drawn and motor-propelled vehicles, sundry civil act of Aug. 1, 1914 (38 Stats., 632)	100,000.00
	Widening to not exceeding 18 feet and improving the surface of roads and for building bridges and culverts *in the forest reserve* leading out of the park from the east boundary to make such roads suitable and safe for animal-drawn and motor-propelled vehicles, sundry civil act of Aug. 1, 1914 (38 Stats., 633)	30,000.00
1916.	Maintenance and repair of improvements, sundry civil act of Mar. 3, 1915 (38 Stats., 845)	125,000.00
	Widening and improving surface of roads, for building bridges and culverts to make such roads suitable and safe for animal-drawn and motor-propelled vehicles, sundry civil act of Mar. 3, 1915 (38 Stats., 845)	50,000.00
	Completing the widening to not exceeding 18 feet of roadway and improving the surface of roads and for building bridges and culverts *in the forest reserve* leading out of the park from the east boundary, to make such roads suitable and safe for animal-drawn and motor-propelled vehicles, sundry civil act of Mar. 3, 1915 (38 Stat., 845)	20,000.00
1917.	Maintenance and repair of improvements, sundry civil act of July 1, 1916 (39 Stats., 288)	152,500.00
	For completing the widening to not exceeding 18 feet of roadway and improving the surface of roads and for building bridges and culverts *in the forest reserve* leading out of the park from the east boundary, sundry civil act of July 1, 1916 (39 Stats., 289)	6,000.00
	Widening and improving surface of roads, for building bridges and culverts to make such roads suitable and safe for animal-drawn and motor-propelled vehicles, sundry civil act of July 1, 1916 (39 Stats., 289)	38,700.00
1918.	For maintenace and repair of improvements, sundry civil act of June 12, 1917 (40 Stats., 105, 132)	147,500.00
	For resurfacing and for finishing the belt line with oil macadam, sundry civil act of June 12, 1917 (40 Stats., 105, 132)	20,000.00
	Total	3,213,095.86

RECAPITULATION.

Appropriations under the Interior Department, 1879 to 1919, inclusive	717,427.98
Appropriations under the War Department, 1888 to 1918, inclusive	3,213,095.86
Total	3,930,523.84

YOSEMITE NATIONAL PARK, CAL.[1]

[From Oct. 1, 1890, to July 1, 1898, no appropriations for the park were made by Congress.]

1899.	For improvement, sundry civil act of July 1, 1898 (30 Stats., 624)	$4,000.00
1900.	For improvement, sundry civil act of Mar. 3, 1899 (30 Stats., 1100)	4,000.00
1901.	Protection and improvement, sundry civil act of June 6, 1900 (31 Stats., 618)	4,000.00
1902.	Protection and improvement, sundry civil act of Mar. 3, 1901 (31 Stats., 1162)	4,000.00
1903.	Protection and improvement, sundry civil act of June 28, 1902 (32 Stats., 456)	6,000.00
	Payment of expenses incurred by officer detailed from Sequoia Park to Yosemite Park for investigation, deficiency act of Mar. 3, 1903 (32 Stats., 1060)	49.25
1904.	Protection and improvement, sundry civil act of Mar. 3, 1903 (32 Stats., 1119)	6,000.00
1905.	Protection and improvement, sundry civil act of Apr. 28, 1904 (33 Stats., 487)	5,400.00
	Yosemite Park Lands Commission, for examination of conditions, etc., to ascertain what parts not necessary for park purposes, and determine course proposed road to Yosemite Valley, sundry civil act of Apr. 28, 1904 (33 Stats., 487)	3,000.00
1906.	Protection and improvement, sundry civil act of Mar. 3, 1905 (33 Stats., 1188)	5,400.00
	Management, protection, and improvement, joint resolution of Mar. 3, 1905 (33 Stats., 1286)	20,000.00
1907.	Protection and improvement, sundry civil act of June 30, 1906 (34 Stats., 729)	5,750.00
1908.	Protection and improvement, sundry civil act of Mar. 4, 1907 (34 Stats., 1337)	30,000.00
1909.	Protection and improvement, sundry civil act of May 27, 1908 (35 Stats., 351)	30,000.00
1910.	Protection and improvement, sundry civil act of Mar. 4, 1909 (35 Stats., 990)	30,000.00
1911.	Protection and improvement, sundry civil act of June 25, 1910 (36 Stats., 745)	62,000.00
	For examination of water supply in the Yosemite National Park for the city of San Francisco, sundry civil act of June 25, 1910 (36 Stats., 745)	12,000.00
1912.	Protection and improvement, construction and repair of bridges, fences, and trails, and improvement of roads other than toll roads, sundry civil act of Mar. 4, 1911 (36 Stats., 1420)	50,000.00
1913.	Protection and improvement, construction and repair of bridges, fences, and trails, and improvement of roads other than toll roads, sundry civil act of Aug. 24, 1912 (37 Stats., 460)	80,000.00
1914.	Protection and improvement, construction and repair of bridges, fences, and trails, and improvement of roads other than toll roads, sundry civil act of June 23, 1913 (38 Stats., 49)	125,000.00
1915.	Protection and improvement, construction and repair of bridges, fences, and trails, and improvement of roads other than toll roads, sundry civil act of Aug. 1, 1914 (38 Stats., 649)	100,000.00
1916.	Protection and improvement, construction and repair of bridges, fences, and trails and improvement of roads other than toll roads, including not exceeding $2,700 for maintenance and repair of horse-drawn passenger-carrying vehicles, sundry civil act of Mar. 3, 1915 (38 Stats., 863)	75,000.00

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[1] Created by act of Oct. 1, 1890 (26 Stats., 650); boundaries changed by act of Feb. 7, 1905 (33 Stats., 702), and joint resolution of June 11, 1906 (34 Stats., 831), the latter accepting recession of Yosemite Valley from the State of California.

1916.	To cover claim of Crane Co. for water system supplies as reported in House Document 1579, Sixty-third Congress, third session, deficiency act of Mar. 4, 1915 (38 Stats., 1157)	$196.80
1917.	Protection and improvement, construction and repair of bridges, fences, and trails, and improvement of roads other than toll roads, including not exceeding $500 for maintenance and repair of horse-drawn passenger-carrying vehicles, not exceeding $75,000 for grading in width not exceeding 20 feet El Portal-Yosemite road, and not exceeding $150,000 for installation of a hydroelectric power plant, sundry civil act of July 1, 1916 (39 Stats., 308)	250,000.00
1918.	For protection and improvement, construction and repair of bridges, fences, and trails, and improvement of roads other than toll roads, including $8,000 for a bridge at the old Sentinel Bridge site, and not exceeding $75,000 for grading in width not exceeding 20 feet El Portal-Yosemite road; also not exceeding $60,000 for the completion of the installation of the hydroelectric power plant authorized by the sundry civil act for the fiscal year 1917, sundry civil act of June 12, 1917 (40 Stats., 105, 152); in all	235,000.00
1919.	For protection and improvement, including $15,000 for new bridge on Sentinel Bridge site and $75,000 for continuing reconstruction of El Portal-Yosemite Road, sundry civil act of July 1, 1918 (Public No. 181, 65th Cong.)	255,000.00
	Total	1,389,796.05

Specific appropriations by Congress from the revenue fund of Yosemite Park.

1918.	For completion of the installation of the hydroelectric power plant, deficiency act of Mar. 28, 1918 (Public No. 109, 65th Cong.)	$3,500.00

GLACIER NATIONAL PARK, MONT.[1]

1911.	For improvement of Glacier National Park, the construction and repair of roads and trails, sundry civil act of June 25, 1910 (36 Stats., 745)	$15,000.00
1912.	For administration and improvement, construction of roads. bridges, telephone lines, and repair of roads, trails, and bridges (appropriation made immediately available), sundry civil act of Mar. 4, 1911 (36 Stats., 1421)	69,200.00
1913.	For administration and improvement, construction of roads, bridges, telephone lines, and repair of roads, trails and bridges, sundry civil act of Aug. 24, 1912 (37 Stats., 460)	75,000.00
1914.	For administration and improvement, construction and repair of roads, bridges, and telephone lines, sundry civil act of June 23, 1913 (38 Stats., 49)	100,000.00
1915.	For administration and improvement, construction and repair of roads, trails, bridges, and telephone lines, sundry civil act of Aug. 1, 1914 (38 Stats., 648–649)	75,000.00
1916.	For administration and improvement, construction and repair of roads, trails, bridges, and telephone lines, sundry civil act of Mar. 3, 1915 (38 Stats., 862–863)	75,000.00
1917.	For administration and improvement, construction and repair of roads, trails, bridges, and telephone lines, including $10,000 reimbursement to Great Northern Railway Co. for repair of 32 miles of roads in the Blackfeet Indian Reservation, sundry civil act of July 1, 1916 (39 Stats., 307–308)	110,000.00

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[1] Created by act of Congress approved May 11, 1910 (36 Stats., 354).

1918.	For administration and improvement, construction and repair of roads, trails, bridges, and telephone lines, including necessary repairs to the roads from Glacier Park station through the Blackfeet Indian Reservation to various points in the boundary line of the park, and for the purchase and maintenance of horse-drawn and motor-driven passenger-carrying vehicles for the use of the supervisor and employees in connection with general park work, sundry civil act of June 12, 1917 (40 Stats., 105, 151)	$115,000.00
1919.	For administration and improvement, including necessary repairs to the roads from Glacier Park station through the Blackfeet Indian Reservation to various points in the boundary line of Glacier National Park, sundry civil act of July 1, 1918 (Public, No. 181, 65th Cong.)	80,000.00
	Total	714,200.00

SEQUOIA NATIONAL PARK, CAL.[1]

[From Sept. 25, 1890, to June 6, 1900, no appropriations for the park were made by Congress.]

1901.	Protection and improvement, sundry civil act of June 6, 1900 (31 Stats., 618)	$10,000.00
1902.	Protection and improvement, sundry civil act of Mar. 3, 1901 (31 Stats., 1162)	10,000.00
1903.	Protection and improvement, sundry civil act of June 28, 1902 (32 Stats., 456)	10,000.00
1904.	Protection and improvement, sundry civil act of Mar. 3, 1903 (32 Stats., 1119)	10,000.00
	Protection and improvement, deficiency act of Mar. 3, 1903 (32 Stats., 1060)	89.69
1905.	Protection and improvement, sundry civil act of Apr. 28, 1904 (33 Stats., 487)	10,000.00
1906.	Protection and improvement, sundry civil act of Mar. 3, 1905 (33 Stats., 1188)	10,000.00
1907.	Protection and improvement, sundry civil act of June 30, 1906 (34 Stats., 729)	10,000.00
1908.	Protection and improvement, sundry civil act of Mar. 4, 1907 (34 Stats., 1337)	15,550.00
1909.	Protection and improvement, sundry civil act of May 27, 1908 (35 Stats., 351)	15,550.00
1910.	Protection and improvement, sundry civil act of Mar. 4, 1909 (35 Stats., 990)	15,550.00
1911.	Protection and improvement, sundry civil act of June 25, 1910 (36 Stats., 745)	15,550.00
1912.	Protection and improvement, construction and repair of bridges, fences, and trails, sundry civil act of Mar. 4, 1911 (36 Stats., 1421)	15,550.00
1913.	Protection and improvement, construction and repair of bridges, fences, and trails, and improvement of roads other than toll roads, sundry civil act of Aug. 24, 1912 (37 Stats., 460)	15,550.00
1914.	Protection and improvement, construction and repair of bridges, fences, and trails, and improvement of roads other than toll roads, sundry civil act of June 23, 1913 (38 Stats., 49)	15,550.00
1915.	Protection and improvement, construction and repair of bridges, fences, and trails, and improvement of roads other than toll roads, including the purchase of site for ranger station not to exceed $500, sundry civil act of Aug. 1, 1914 (38 Stats., 649)	15,550.00
1916.	Protection and improvement, construction and repair of bridges, fences, and trails, and improvement of roads other than toll roads, including the purchase of site for ranger station not to exceed $500, sundry civil act of Mar. 3, 1915 (38 Stats., 863)	15,550.00

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[1] Created by acts of Sept. 25, 1890 (26 Stats., 478), and Oct. 1, 1890 (26 Stats., 650).

1917.	Protection and improvement, construction and repair of bridges, fences, and trails, and improvement of roads other than toll roads, sundry civil act of July 1, 1916 (39 Stats., 308)	$22,300.00
	Purchase of lands in Sequoia National Park, sundry civil act of July 1, 1916 (39 Stats., 308)	50,000.00
1918.	For protection and improvement, construction and repair of bridges, fences, and trails, and improvement of roads other than toll roads, sundry civil act of June 12, 1917 (40 Stats., 105, 152)	25,000.00
1919.	For protection and improvement, including not exceeding $12,000 for a bridge at old Marble Fork Bridge site, sundry civil act of July 1, 1918 (Public No. 181, 65th Cong.)	30,510.00
	Total	837,849.69

GENERAL GRANT NATIONAL PARK, CAL.[1]

[From Oct. 1, 1890, to June 6, 1900, no appropriations for the park were made by Congress.]

1901.	Improvement of park, sundry civil act of June 6, 1900 (31 Stats., 618)	$2,500.00
1902.	Protection and improvement, sundry civil act of Mar. 3, 1901 (31 Stats., 1162)	2,500.00
1903.	Protection and improvement, sundry civil act of June 28, 1902 (32 Stats., 456)	2,500.00
1904.	Protection and improvement, sundry civil act of Mar. 3, 1903 (32 Stats., 1119)	2,000.00
	For improvement of park in 1901, deficiency act of Mar. 3, 1903 (32 Stats., 1060)	58.65
1905.	Protection and improvement, sundry civil act of Apr. 28. 1904 (33 Stats., 487)	2,000.00
1906.	Protection and improvement, sundry civil act of Mar. 3, 1905 (33 Stats., 1188)	2,000.00
1907.	Protection and improvement, sundry civil act of June 30, 1906 (34 Stats., 729)	2,000.00
1908.	Protection and improvement, sundry civil act of Mar. 4, 1907 (34 Stats., 1337)	2,000.00
1909.	Protection and improvement, sundry civil act of May 27, 1908 (35 Stats., 351)	2,000.00
1910.	Protection and improvement, sundry civil act of Mar. 4, 1909 (35 Stats., 990)	2,000.00
1911.	Protection and improvement, sundry civil act of June 25, 1910 (36 Stats., 745)	2,000.00
1912.	Protection and improvement, sundry civil act of Mar. 4, 1911 (36 Stats., 1421)	2,000.00
1913.	Protection and improvement, construction of fences and trails, and repairing and extension of roads, sundry civil act of Aug. 24, 1912 (37 Stats., 460)	2,000.00
1914.	Protection and improvement, construction of fences and trails, and repairing and extension of roads, sundry civil act of June 23, 1913 (38 Stats., 49)	2,000.00
1915.	Protection and improvement, construction of fences and trails, and repairing and extension of roads, sundry civil act of Aug. 1, 1914 (38 Stats., 649)	2,000.00
1916.	Protection and improvement, construction of fences and trails, and repairing and extension of roads, sundry civil act of Mar. 3, 1915 (38 Stats., 863)	2,000.00
1917.	Protection and improvement, construction of fences and trails, and repairing and extension of roads, sundry civil act of July 1, 1916 (39 Stats., 308)	2,000.00
1918.	For protection and improvement, construction of fences and trails, and repairing and extension of roads, sundry civil act of June 12, 1917 (40 Stats., 105, 152)	2,000.00

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[1] Created by act of Oct. 1, 1890 (26 Stats., 650).

1919.	For protection and improvement, construction of fences and trails, and repairing and extension of roads, sundry civil act of July 1, 1918 (Public No. 181, 65th Cong.)	$4,500.00
	Total	42,058.65

MOUNT RAINIER NATIONAL PARK, WASH.[1]

UNDER INTERIOR DEPARTMENT.

[From Mar. 2, 1899, to June 30, 1906, no appropriations for the park were made by Congress.]

1907.	Protection and improvement, sundry civil act of June 30, 1906 (34 Stats., 729)	$2,500.00
1908.	Protection and improvement, sundry civil act of Mar. 4, 1907 (34 Stats., 1337)	3,000.00
1909.	Protection and improvement, sundry civil act of May 27, 1908 (35 Stats., 351)	3,000.00
1910.	Protection and improvement, sundry civil act of Mar. 4, 1909 (35 Stats., 991)	3,000.00
1911.	Protection and improvement, sundry civil act of June 25, 1910 (36 Stats., 745)	3,000.00
1912.	Protection and improvement, construction of bridges, fences, and trails, etc., sundry civil act of Mar. 4, 1911 (36 Stats., 1421)	[2] 5,000.00
1913.	Protection and improvement, construction of bridges, fences, and trails, and improvement of roads, sundry civil act of Aug. 24, 1912 (37 Stats., 460)	20,000.00
1914.	Protection and improvement, construction of bridges, fences, and trails, and improvement of roads, sundry civil act of June 23, 1913 (38 Stats., 50)	13,400.00
	For survey for the extension of the present road from a point at or about Longmire Springs eastward to the eastern boundary line of the forest reserve surrounding the park and for survey of necessary trails, sundry civil act of June 23, 1913 (38 Stats., 50)	10,000.00
1915.	Protection and improvement, construction of bridges, fences, and trails, and improvement of roads, sundry civil act of Aug. 1, 1914 (38 Stats., 649)	51,000.00
1916.	Protection and improvement, construction of bridges, fences, and trails, and improvement of roads, sundry civil act of Mar. 3, 1915 (38 Stats., 863)	30,000.00
1917.	Protection and improvement, construction of bridges, fences, and trails, and improvement of roads, sundry civil act of July 1, 1916 (39 Stats., 308)	30,000.00
1918.	Protection and improvement, construction of roads, bridges, fences, and trails, and improvement of roads, including not exceeding $1,250 for the purchase of a motor-driven vehicle and the maintenance and repair thereof, sundry civil act of June 12, 1917 (40 Stats., 105, 152)	75,000.00
1919.	For protection and improvement, construction of roads, bridges, fences, and trails, and improvement of roads, sundry civil act of July 1, 1918 (Public, No. 181, 65th Cong.)	24,600.00
	Total	273,500.00

UNDER WAR DEPARTMENT.

1903.	Survey of most practicable route for wagon road into park and toward construction of said road after survey shall have been made, deficiency act of Mar. 3, 1903 (32 Stats., 1131)	10,000.00

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[1] Created by act of Mar. 2, 1899 (30 Stats., 993).

[2] By the act of Aug. 14, 1911 (37 Stats., 38), the above-mentioned appropriation was reduced to $5,000.

1904.	Continuing construction wagon road, sundry civil act of Apr. 28, 1904 (33 Stats., 498)	$30,000.00
1906.	Continuing construction wagon road, sundry civil act of June 30, 1906 (34 Stats., 744)	50,000.00
1907.	Continuing construction wagon road, sundry civil act of Mar. 4, 1907 (34 Stats., 1349)	50,000.00
1908.	Continuing construction wagon road, sundry civil act of May 27, 1908 (35 Stats., 365)	50,000.00
1909.	Completion of wagon road, sundry civil act of Mar. 4, 1909 (35 Stats., 1005)	25,000.00
1910.	Additional work upon wagon road, sundry civil act of June 25, 1910 (36 Stats., 725)	25,000.00
	Total	240,000.00

RECAPITULATION.

Appropriations under the Interior Department, 1907 to 1919, inclusive	273,500.00
Appropriations expended under the War Department, 1903 to 1910, inclusive	240,000.00
Total	513,500.00

CRATER LAKE NATIONAL PARK, OREG.[1]

UNDER INTERIOR DEPARTMENT.

1902 and 1903.	Protection and improvement, deficiency act of July 1, 1902 (32 Stats., 571)	$2,000.00
1904.	Protection and improvement, sundry civil act of Mar. 3, 1903 (32 Stats., 1119)	2,000.00
1905.	Protection and improvement, sundry civil act of Apr. 28, 1904 (33 Stats., 487)	3,000.00
1906.	Protection and improvement, sundry civil act of Mar. 3, 1905 (33 Stats., 1188)	3,000.00
1907.	Protection and improvement, sundry civil act of June 30, 1906 (34 Stats., 729)	3,000.00
1908.	Protection and improvement, sundry civil act of Mar. 4, 1907 (34 Stats., 1337)	7,315.00
1909.	Protection and improvement, sundry civil act of May 27, 1908 (35 Stats., 351)	3,000.00
1910.	Protection and improvement, sundry civil act of Mar. 4, 1909 (35 Stats., 990)	3,000.00
1911.	Protection and improvement, sundry civil act of June 25, 1910 (36 Stats., 745)	3,000.00
1912.	Protection and improvement, sundry civil act of Mar. 4, 1911 (36 Stats., 1421)	3,000.00
1913.	Protection and improvement, sundry civil act of Aug. 24, 1912 (37 Stats., 460)	3,000.00
1914.	Protection and improvement and repairing and extension of roads, sundry civil act of June 23, 1913 (38 Stats., 50)	7,540.00
1915.	Protection and improvement and repairing and extension of roads, sundry civil act of Aug. 1, 1914 (38 Stats., 649)	8,040.00
1916.	Protection and improvement and repairing and extension of roads, sundry civil act of Mar. 3, 1915 (38 Stats., 863)	8,000.00
1917.	Protection and improvement and repairing and extension of roads, sundry civil act of July 1, 1916 (39 Stats., 308)	8,000.00
1918.	Protection and improvement and repairing and extension of roads, sundry civil act of June 12, 1917 (40 Stats., 105, 152)	15,000.00
1919.	For protection and improvement and repairing and extension of roads, sundry civil act of July 1, 1918 (Public No. 181, 65th Cong.)	13,225.00
	Total	95,120.00

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[1] Created by act of May 22, 1902 (32 Stats., 202).

UNDER WAR DEPARTMENT.

1910.	Surveying, locating, and preparing plans and estimates for roads and trails in the park, sundry civil act of June 25, 1910 (36 Stats., 725)	$10,000.00
1913.	Construction of wagon road and necessary bridges through park, with system of tanks and water-supply pipes for sprinkling, sundry civil act of Aug. 24, 1912 (37 Stats., 443)	50,000.00
1914.	Continuation of the construction of a wagon road and the necessary bridges through park, with system of tanks and water-supply pipes for sprinkling, sundry civil act of June 23, 1913 (38 Stats., 33)	75,000.00
1915.	Continuation of the construction of a wagon road and the necessary bridges through park, with system of tanks and water-supply pipes for sprinkling, sundry civil act of Aug. 1, 1914 (38 Stats., 633)	85,000.00
1916.	Continuation of the construction of a wagon road and the necessary bridges through park, with system of tanks and water-supply pipes for sprinkling, sundry civil act of Mar. 3, 1915 (38 Stats., 845)	50,000.00
1917.	Continuation of the construction of a wagon road and the necessary bridges through park, with system of tanks and water-supply pipes for sprinkling, also for maintenance, repair, and operation of two horse-drawn passenger-carrying vehicles, sundry civil act of July 1, 1916 (39 Stats., 289)	50,000.00
1918.	For continuation of a wagon road and the necessary bridges through the park, together with a system of tanks and water-supply pipes for sprinkling (H. Doc. 328, 62d Cong., 2d sess.), and for maintenance, repair, and operation of two horse-drawn passenger-carrying vehicles, sundry civil act of June 12, 1917 (40 Stats., 105, 132)	50,000.00
1919.	For construction and maintenance of a wagon road and the necessary bridges through the park, together with a system of tanks and water-supply pipes for sprinkling, sundry civil act of July 1, 1918 (Public No. 181, 65th Cong.)	50,000.00
	Total	420,000.00

RECAPITULATION.

Appropriations under the Interior Department, 1902 to 1919, inclusive	95,120.00
Appropriations expended under the War Department, 1910 to 1919, inclusive	420,000.00
Total	515,120.00

WIND CAVE NATIONAL PARK, S. DAK.[1]

1904.	Protection and improvement, sundry civil act of Mar. 3, 1903 (32 Stats., 1119)	$2,500.00
1905.	Protection and improvement, sundry civil act of Apr. 28, 1904 (33 Stats., 487)	2,500.00
1906.	Protection and improvement, sundry civil act of Mar. 3, 1905 (33 Stats., 1188)	2,500.00
1907.	Protection and improvement, sundry civil act of June 30, 1906 (34 Stats., 729)	4,400.00
1908.	Protection and improvement, sundry civil act of Mar. 4, 1907 (34 Stats., 1337)	2,500.00
1909.	Protection and improvement, sundry civil act of May 27, 1908 (35 Stats., 352)	2,500.00
1910.	Protection and improvement, sundry civil act of Mar. 4, 1909 (35 Stats., 991)	2,500.00

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[1] Created by act of Jan. 9, 1903 (32 Stats., 765).

1911.	Protection and improvement, sundry civil act of June 25, 1910 (36 Stats., 745)	$2,500.00
1912.	Management, improvement, and protection, sundry civil act of Mar. 4, 1911 (36 Stats., 1421)	2,500.00
1913.	No appropriation made.	
1914.	Improvement and protection, sundry civil act of June 23, 1913 (38 Stats., 50)	2,500.00
1915.	Protection and improvement, sundry civil act of Aug. 1, 1914 (38 Stats., 649)	2,500.00
1916.	Protection and improvement, sundry civil act of Mar. 3, 1915 (38 Stats., 863)	2,500.00
1917.	Protection and improvement, sundry civil act of July 1, 1916 (39 Stats., 308)	2,500.00
1918.	For improvement and protection, sundry civil act of June 12, 1917 (40 Stats., 105, 152)	2,500.00
1919.	For improvement and protection, sundry civil act of July 1, 1918 (Public No. 181, 65th Cong.)	4,000.00
	Total	40,900.00

UNDER DEPARTMENT OF AGRICULTURE.[1]

1913.	For the establishment of a national game preserve, to be known as the Wind Cave National Game Preserve, upon the land embraced within the boundaries of the Wind Cave National Park, in the State of South Dakota, for a permanent national range for a herd of buffalo to be presented to the United States by the American Bison Society, and for such other native American game animals as may be placed therein. The Secretary of Agriculture is authorized to acquire by purchase or condemnation such adjacent lands as may be necessary for the purpose of assuring an adequate permanent water supply, and to inclose the said game preserve with a good and substantial fence and to erect thereon all necessary sheds and buildings for the proper care and maintenance of the said animals, to be available until expended, Agricultural act of August 10, 1912 (37 Stats., 293)	26,000.00

RECAPITULATION.

Appropriations under the Interior Department, 1904 to 1919, inclusive	40,900.00
Appropriation expended under the Department of Agriculture, appropriated for the fiscal year 1913 and made available until expended	26,000.00
Total	66,900.00

MESA VERDE NATIONAL PARK, COLO.[2]

1908.	Protection and improvement, sundry civil act of Mar. 4, 1907 (34 Stats., 1337)	$7,500.00
1909.	Protection and improvement, sundry civil act of May 27, 1908 (35 Stats., 351)	7,500.00
1910.	Protection and improvement, sundry civil act of Mar. 4, 1909 (35 Stats., 990)	7,500.00
1911.	Protection and improvement, inclusive of $12,500 reserved within appropriation for construction of main wagon road through the park, sundry civil act of June 25, 1910 (36 Stats., 745)	20,000.00
	For examination and leasing, etc., of coal lands in the park, deficiency act of June 25, 1910 (36 Stats., 796)	2,000.00

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[1] Funds for the maintenance and further improvement of this game preserve are allotted each year from lump-sum appropriations for the Biological Survey, Department of Agriculture.

[2] Created by act of June 29, 1906 (34 Stats., 616).

1912. Protection and improvement, sundry civil act of Mar. 4, 1911 (36 Stats., 1421)	$7,500.00
1913. Protection and improvement, sundry civil act of Aug. 24, 1912 (37 Stats., 460)	15,000.00
1914. Protection and improvement, sundry civil act of June 23, 1913 (38 Stats., 50)	10,000.00
1915. Protection and improvement, sundry civil act of Aug. 1, 1914 (38 Stats., 649)	10,000.00
1916. Protection and improvement, sundry civil act of Mar. 3, 1915 (38 Stats., 863)	10,000.00
1917. Protection and improvement, sundry civil act of July 1, 1916 (39 Stats., 308)	10,000.00
1918. Protection and improvement, sundry civil act of June 12, 1917 (40 Stats., 105, 152)	10,000.00
1919. For protection and improvement, sundry civil act of July 1, 1918 (Public No. 181, 65th Cong.)	18,000.00
Total	135,000.00

PLATT NATIONAL PARK.[1] (Formerly Sulphur Springs Reservation, Okla.)

[From July 1, 1902, to June 25, 1910, no appropriations for the park were made by Congress.]

1909 and 1910. Appropriation of $16,000 for certain specified improvements out of park-revenue fund. This was ineffective, as the revenue-fund balance was only sufficient to carry a reduced force of employees for the proper protection of the park, sundry civil act of Mar. 4, 1909 (35 Stats., 991).	
1911. Care and maintenance, including all personal services, sundry civil act of June 25, 1910 (36 Stats., 745)	$5,000.00
1912. Maintenance, bridging, roads, trails, and sewerage, sundry civil act of Mar. 4, 1911 (36 Stats., 1420)	10,000.00
1913. Maintenance, bridging, roads, and trails, sundry civil act of Aug. 24, 1912 (37 Stats., 460)	8,000.00
1913. Construction sanitary sewer (contingent on city of Sulphur, Okla., appropriating a similar sum), Indian appropriation act of Aug. 24, 1912 (37 Stats., 532)	17,500.00
1914. Maintenance, bridging, roads, and trails, deficiency appropriation act of Oct. 22, 1913 (38 Stats., 218)	8,000.00
1915. Maintenance, bridging, roads, and trails, sundry civil act of Aug. 1, 1914 (38 Stats., 649)	8,000.00
1916. Maintenance, bridging, roads, and trails, sundry civil act of Mar. 3, 1915 (38 Stats., 863)	8,000.00
To cover the cost of repairing damage to bridges, roads, trails, buildings, etc., deficiency appropriation act of Mar. 31, 1916 (39 Stats., 42)	10,000.00
1917. For improvement and protection, sundry civil act of July 1, 1916 (39 Stats., 308)	8,000.00
1918. For improvement and protection, sundry civil act of June 12, 1917 (40 Stats., 105, 152)	7,180.00
1919. For improvement and protection, sundry civil act of July 1, 1918 (Public, No. 181, 65th Congress)	7,500.00
Total	97,180.00

SULLYS HILL PARK, N. DAK.[2]

UNDER THE DEPARTMENT OF THE INTERIOR.

[From June 2, 1904, to June 30, 1913, no appropriations for the park were made by Congress.]

1914. For examination of the land embraced in Sullys Hill Park to determine whether it contains valuable minerals, Indian appropriation act of June 30, 1913 (38 Stats., 92)	$500.00

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[1] Created by acts of July 1, 1902 (32 Stats., 641), and Apr. 21, 1904 (33 Stats., 220); name changed by joint resolution of June 29, 1906 (34 Stats., 837).

[2] Created by Executive proclamation of June 2, 1904, under the act approved Apr. 27, 1904 (33 Stats., 319).

UNDER DEPARTMENT OF AGRICULTURE.

1915.	For the improvement of the game preserve in the park, Agricultural appropriation act of June 30, 1914 (38 Stats., 434)	$5,000.00
1916.	For the improvement of the game preserve in the park, including construction of fences, sheds, buildings, corrals, roads, and other structures which may be necessary, Agricultural appropriation act of Mar. 4, 1915 (38 Stats., 1105)	5,000.00
1917.	For the improvement of the game preserve in the park, including construction of fences, sheds, buildings, corrals, roads, and other structures which may be necessary, Agricultural appropriation act of Aug. 11, 1916 (39 Stats., 467)	5,000.00
1918.	For the maintenance and improvement of the game preserves in Sullys Hill National Park, including the construction of all fences, sheds, buildings, corrals, roads, and other structures which may be necessary, in addition to the amount heretofore appropriated, available until expended, Agricultural appropriation act of Mar. 4, 1917 (39 Stats., 1155)	5,000.00
	Total	20,000.00

RECAPITULATION.

Appropriations under the Interior Department, fiscal year 1914	500.00
Appropriations expended under the Department of Agriculture, 1914 to 1918, inclusive	20,000.00
Total	20,500.00

ROCKY MOUNTAIN NATIONAL PARK.[1]

1915.	For protection and improvement, deficiency appropriation act of Mar. 4, 1915 (38 Stats., 1148)	$3,000.00
1916.	For protection and improvement, sundry civil act of Mar. 3, 1915 (38 Stats., 863)	8,000.00
1917.	For protection and improvement, sundry civil act of July 1, 1916 (39 Stats., 308)	10,000.00
1918.	For protection and improvement, sundry civil act of June 12, 1917 (40 Stats., 105, 152)	10,000.00
1919.	For protection and improvement, sundry civil act of July 1, 1918 (Public, No. 181, 65th Cong.)	10,000.00
	Total	41,000.00

HOT SPRINGS RESERVATION, ARK.[2]

[From Apr. 20, 1832, to Mar. 3, 1877, no appropriations were made by Congress.]

TITLE: PROTECTION AND IMPROVEMENT, HOT SPRINGS RESERVATION.[3]

Specific appropriations by Congress from revenue fund.

1893.	Improvement of Whittington Lake Reserve from proceeds of sale of lots included in above fund, 1892,[4] sundry civil act Aug. 5, 1892 (27 Stats., 373)	[5]$30,000.00
1896.	To repay expenditures upon a sewer, 1896, act May 1, 1896 (29 Stats., 110)	[5]930.00

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[1] Created by act of Jan. 26, 1915 (38 Stats., 798).

[2] Created by acts of Apr. 20, 1832 (4 Stats., 505); Mar. 3, 1877 (19 Stats., 377); and June 16, 1880 (21 Stats., 289).

[3] Designations given on books of Treasury Department.

[4] Years scheduled on books of Treasury Department.

[5] Without year.

1913. For survey for storm drainage and sanitary sewer system city of Hot Springs, abutting Hot Springs Reservation, sundry civil act of Aug. 24, 1912 (37 Stats., 457)	$5,000.00
1918. For the employment of a landscape engineer and such other expenses as may be required for the preparation of a practical and comprehensive plan, together with an accurate estimate of the cost thereof, for improving the Hot Springs Reservation, sundry civil act of June 12, 1917 (40 Stats., 105, 153)	10,000.00
1919. For labor, material, supervision, clearing site, and all other necessary expenses incident to the construction of a new administration and Government free bathhouse building to cost not to exceed $190,000,[1] sundry civil act of July 1, 1918 (Public No. 181, 65th Cong.)	50,000.00
Total	95,930.00

TITLE: IMPROVEMENT, HOT SPRINGS RESERVATION.[2]

Specific appropriation by Congress from revenue fund.

Improvement of Hot Springs Creek, 1883,[3] sundry civil act of Aug. 7, 1882 (22 Stats., 329)	[4] $33,744.78

This amount accrued to the revenue fund from operation of the bathhouses by the Court of Claims receiver in 1878.

TITLE: SALARIES AND EXPENSES, HOT SPRINGS RESERVATION.[2]

Salaries and expenses, Hot Springs Commission, 1877,[3] sundry civil act of Mar. 3, 1877 (19 Stats., 356)	[4] $27,500.00
Same as above, 1878, deficiency act of Dec. 15, 1877 (20 Stats., 12)	[4] 15,000.00
Same as above, 1879, act of Dec. 16, 1878 (20 Stat., 258)	[4] 27,500.00
Same as above, 1879, deficiency act of Mar. 3, 1879 (20 Stats., 415)	[4] 12,000.00
Total	[6] 82,000.00

TITLE: PROTECTION AND IMPROVEMENT, HOT SPRINGS RESERVATION.

Specific appropriations by Congress from moneys in Treasury not otherwise appropriated.

Improvement of Hot Springs Creek, 1885,[3] sundry civil act July 7, 1884 (23 Stats., 208)	[5] $75,000.00
Same as above, 1886, sundry civil act Mar. 3, 1885 (23 Stats., 498)	[5] 8,000.00
Same as above, 1887, sundry civil act Aug. 4, 1886 (24 Stats., 239)	[5] 20,000.00
Reservoirs, pumps, piping, and improvement of the free bathhouse, sundry civil act Oct. 2, 1888 (25 Stats., 527)	[5] 36,000.00
Improvement of the free bathhouse, 1890, deficiency act Apr. 4, 1890 (26 Stats., 40)	[5] 3,200.00
For mains, pipes, pumping engine, etc., 1891, deficiency act of Sept. 30, 1890 (26 Stats., 523)	[5] 5,000.00
Construction of roads, 1892, sundry civil act of Mar. 3, 1891 (26 Stats., 972)	[5] 5,000.00
Total	152,200.00

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[1] $140,000 from appropriations. See next page.
[2] Designation given on books of Treasury Department.
[3] Years scheduled on books of Treasury Department.
[4] Without year.
[5] Reimbursable from fund arising from sale of Hot Springs lots, but treated by Treasury Department as a direct appropriation.
[6] Limited to fiscal years.

TITLE: HOT SPRINGS RESERVATION.[1]

Specific appropriations by Congress from moneys in Treasury not otherwise appropriated.

Repairs to roads, drives, etc., and remodeling free bathhouse, 1903,[2] sundry civil act of June 28, 1902 (32 Stats., 456)	[3] $48,562.00
Repairs to roads, etc., and storage reservoir, 1904, sundry civil act of Mar. 3, 1903 (32 Stats., 1119)	[3] 30,500.00
Reimbursement of disbursing officer, 1904, deficiency act of Feb. 18, 1904 (32 Stats., 32)	[3] 500.00
Installation of electric motor for the free bathhouse, 1904, deficiency act of Apr. 27, 1904 (33 Stats., 409)	[4] 1,550.00
For gutters on mountain roads, 1905, sundry civil act of Apr. 28, 1904 (33 Stats., 486)	[4] 8,000.00
Filling lakes in Whittington Park, 1906, sundry civil act of Mar. 3, 1905 (33 Stats., 1177)	[4] 6,000.00
For labor, material. supervision, clearing site, and all other necessary expenses incident to the construction of a new administration and Government free bathhouse building to cost not to exceed $190,000,[5] sundry civil act of July 1, 1918 (Public—No. 181, 65th Congress)	[4] 140,000.00
Total	235,112.00

TITLE: CLAIMS FOR CONDEMNATION OF BUILDINGS, HOT SPRINGS RESERVATION.[1]

Specific appropriations (indefinite) from moneys in Treasury not otherwise appropriated (sundry civil act of Mar. 3, 1901).

1902[2]	[3] $26,385.45
1903	[3] 18,372.07
1904	[3] 3,500.00
1911	[3] 2,935.00
Total	51,192.52

Recapitulation of specific appropriations, 1877 to 1919, inclusive.

Titles of appropriations.	Specific appropriation from revenue fund.	Specific appropriation from Treasury	Total.
Protection and improvement, Hot Springs Reservation	$95,930.00	$152,200.00	$248,130.00
Improvement, Hot Springs Reservation	33,744.78		33,744.78
Hot Springs Reservation		235,112.00	235,112.00
Salaries and expenses, Hot Springs Reservation		82,000.00	82,000.00
Claims for condemnation of buildings, Hot Springs Reservation		51,192.52	51,192.52
Total	129,674.78	520,504.52	650,179.30

HAWAII NATIONAL PARK, HAWAII.[6]

1919. For expenses incident to securing donations of patented lands and rights of way over patented lands in Hawaii National Park, sundry civil act of July 1, 1918 (Public No. 181, 65th Congress)	$750.00

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[1] Designations given on books of Treasury Department.
[2] Years scheduled on books of Treasury Department.
[3] Without year.
[4] Limited to fiscal years.
[5] $50,000 from revenues; see preceding page, "Specific appropriations by Congress from revenue fund."
[6] Created by act of Congress approved Aug. 1, 1916 (39 Stats., 432).

National parks, listed by name and date of creation, for which no appropriations have been made since the date of their establishment: Lassen Volcanic, August 9, 1916 (39 Stats., 442). Mount McKinley, February 26, 1917 (39 Stats., 938).

NATIONAL MONUMENTS.[1]

ADMINISTERED UNDER THE SUPERVISION OF THE SECRETARY OF THE INTERIOR.

[Prior to the fiscal year 1917 no appropriations were made by Congress for the national monuments.]

National Monuments, General.

1917.	Protection of national monuments: For the preservation, development, administration, and protection, sundry civil act of July 1, 1916 (39 Stats., 309)	$3,500.00
1918.	For the preservation, development, administration, and protection of the national monuments, sundry civil act of June 12, 1917 (40 Stats., 105, 152)	5,000.00
1919.	For the preservation, development, administration, and protection of the national monuments, sundry civil act of July 1, 1918 (Public No. 181, 65th Cong.)	10,000.00
	Total	18,500.00

CASA GRANDE NATIONAL MONUMENT, ARIZ.[2]

UNDER INTERIOR DEPARTMENT.

1889.	To enable the Secretary of the Interior to repair and protect the Ruin of Casa Grande, situate in Pinal County, near Florence, Ariz., $2,000; and the President is authorized to reserve from settlement and sale the land on which said ruin is situated and so much of the public land adjacent thereto as in his judgment may be necessary for the protection of said ruin and of the ancient city of which it is a part. Sundry civil act approved Mar. 2, 1889 (25 Stats., 939, 961)	$2,000
	For the pay of a custodian of Casa Grande Ruin, funds have been allotted from the appropriation "For necessary expenses of survey, appraisal and sale, and pay of custodians of abandoned military reservations, including a custodian of the Ruin of Casa Grande," contained in sundry civil acts, as follows:	
1893.	Act approved Aug. 5, 1892 (27 Stats., 349, 370)	480
1894.	Act approved Mar. 3, 1893 (27 Stats., 572, 593)	480
1895.	Act approved Aug. 18, 1894 (28 Stats., 372, 396)	480
1896.	Act approved Mar. 2, 1895 (28 Stats., 910, 938)	480
1897.	Act approved June 11, 1896 (29 Stats., 413, 434)	480
1898.	Act approved June 4, 1897 (30 Stats., 11, 33)	480
1899.	Act approved July 1, 1898 (30 Stats., 597, 620)	480
1900.	Act approved Mar. 3, 1899 (30 Stats., 1074, 1098)	480
1901.	Act approved June 6, 1900 (31 Stats., 588, 616)	480
1902.	Act approved Mar. 3, 1901 (31 Stats., 1133, 1160)	662
1903.	Act approved June 28, 1902 (32 Stats., 419, 454)	900
	By this same act there was also appropriated for repair and protection of the Ruin of Casa Grande	2,000
1904.	Act approved Mar. 3, 1903 (32 Stats., 1083, 1117)	900
1905.	Act approved Apr. 28, 1904 (33 Stats., 452, 485)	900
1906.	Act approved Mar. 3, 1905 (33 Stats., 1156, 1186)	900
1907.	Act approved June 30, 1906 (34 Stats., 697, 726)	900
1908.	Act approved Mar. 4, 1907 (34 Stats., 1295, 1334)	900

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[1] Set apart from public domain under act of June 8, 1906 (34 Stats., 225).

[2] Set aside as a reservation by Executive order dated June 22, 1892, under the act approved March 2, 1889 (25 Stats., 961), and placed under the jurisdiction of the General Land Office. Boundaries changed by presidential proclamation of December 10, 1909 (35 Stats., 2504). Administered as a national park from 1915 to August 3, 1918, when it was made a national monument (40 Stats., Proc. 1470).

1909. Act approved May 27, 1908 (35 Stats., 317, 348)	$900
1910. Act approved Mar. 4, 1909 (35 Stats., 945, 987)	900
1911. Act approved June 25, 1910 (36 Stats., 703, 741)	900
1912. Act approved Mar. 4, 1911 (36 Stats., 1363, 1417)	900
1913. Act approved Aug. 24, 1912 (37 Stats., 417, 457)	900
1914. Act approved June 23, 1913 (38 Stats., 4, 47)	900
1915. Act approved Aug. 1, 1914 (38 Stats., 609, 645)	900
1916. Act approved Mar. 3, 1915 (38 Stats., 822, 856)	900
1917. Act approved July 1, 1916 (39 Stats., 262, 301)	900
1918. Act approved June 12, 1917 (40 Stats., 105, 144)	900
1919. Act approved July 1, 1918 (Pub. No. 181, 65th Cong.)	900
Total	24, 282

UNDER THE SMITHSONIAN INSTITUTION.

Appropriations were made in sundry civil acts "For the protection of Casa Grande Ruin in Pinal County, near Florence, Ariz., and for excavation on the reservation, to be expended under the supervision of the secretary of the Smithsonian Institution," as follows:

1907. Act approved June 30, 1906 (34 Stats, 697, 729)	$3,000
1908. Act approved March 4, 1907 (34 Stats., 1295, 1310)	3,000
Total	6,000

RECAPITULATION.

Appropriations under the Interior Department, 1889 to 1919, inclusive	$24, 282
Appropriations under the Smithsonian Institution, 1907 and 1908	6,000
Total	30, 282

NAVAJO NATIONAL MONUMENT, ARIZ.

1917. For preservation and repair of prehistoric Pueblo ruins and cliff dwellings, under supervision of the Smithsonian Institution, Indian appropriation act approved May 18, 1916 (39 Stats., 132)	$3,000

ZION (FORMERLY MUKUNTUWEAP) NATIONAL MONUMENT, UTAH.

1917. For a proportionate share of the amount required to construct an interstate wagon road or highway through the monument, approximately 15 miles. Deficiency appropriation act approved Sept. 8, 1916 (39 Stats., 818)	$15,000

SIEUR DE MONTS NATIONAL MONUMENT, MAINE.

1919. For protection and improvement, including not exceeding $1,400 for purchase, maintenance, operation, and repair of a motor-driven passenger-carrying vehicle for use of rangers in administration of the monument, sundry civil act approved July1, 1918 (Pub. No. 181, 65th Cong.)	$10,000

APPENDIX D.

LEGISLATION AND PRESIDENTIAL PROCLAMATIONS.

Legislation affecting the national parks, enacted by Congress since date of the first annual report.

Presidential proclamations relating to the national monuments, issued since date of the first annual report.

Executive orders relating to proposed national parks, issued since date of the first annual report.

Senate and House of Repesentatives reports on pending legislation affecting the national parks made since date of the first annual report.

LEGISLATION.

Excerpt from "An act making appropriations to supply urgent deficiencies in appropriations for the fiscal year ending June thirtieth, nineteen hundred and eighteen, and prior fiscal years, on account of war expenses, and for other purposes."

DEPARTMENT OF THE INTERIOR.

NATIONAL PARKS.

The Secretary of the Interior is authorized to expend from the revenues derived from privileges in the Yosemite National Park not to exceed $3,500 in addition to appropriations heretofore made for the completion of the installation of the hydroelectric power plant authorized by the sundry civil appropriation act for the fiscal year nineteen hundred and seventeen.

Approved, March 28, 1918 (Public, No. 109, 65th Congress).

Excerpts from "An act making appropriations for sundry civil expenses of the Government for the fiscal year ending June thirtieth, nineteen hundred and nineteen, and for other purposes."

DEPARTMENT OF THE INTERIOR.

NATIONAL PARKS.

National Park Service: Director, $4,500; assistant director, $2,500; chief clerk, $2,000; draftsman, $1.800; clerks—two of class three, two of class two, two at $900 each; messenger, $600; in all, for park service in the District of Columbia, $19,200.

The limitation of cost upon the construction of any administration or other building in any national park without express authority of Congress, contained in the sundry civil appropriation Act approved August twenty-fourth, nineteen hundred and twelve, is increased from $1,000 to $1,500.

Yellowstone National Park, Wyoming: For administration, protection, maintenance, and improvement, including not to exceed $7,500 for maintenance of the road in the forest reserve leading out of the park from the east boundary, not to exceed $7,500 for maintenance of the road in the forest reserve leading out of the park from the south boundary, for repairing roads in the park and in adjoining forest reserves from Lake Hotel to the Cody entrance, $25,000; not to exceed $7,600 for the purchase, operation, maintenance, and repair of motor-propelled passenger-carrying vehicles, and including feed for buffalo and other animals and salaries of buffalo keepers, $269,520, to be expended by and under the direction of the Secretary of the Interior: *Provided*, That not exceeding $2,000 may be expended for the removal of snow from any of the roads for the purpose of opening them in advance of the tourist season.

Hereafter road extensions and improvements shall be made in said park under and in harmony with the general plan of roads and improvements to be approved by the Secretary of the Interior.

For continuing the widening of not exceeding eighteen feet of roadway, improving the surface of roads, and for building bridges and culverts from the belt-line road to the western border, from the Thumb Station to the southern border, and from the Lake Hotel to the eastern border, all within Yellowstone National Park, to make such roads suitable and safe for animal-drawn and motor-propelled vehicles, $15,400.

For a new road around the Gardiner Slide, $50,000.

For resurfacing and for finishing the belt line with oil macadam, the unexpended balance of the appropriation for the fiscal year nineteen hundred and eighteen is made available for the fiscal year nineteen hundred and nineteen.

Glacier National Park, Montana: For administration and improvement, construction of roads, trails, bridges, and telephone lines and the repair thereof, including necessary repairs to the roads from Glacier Park Station through the Blackfeet Indian Reservation to various points in the boundary line of the

Glacier National Park, including not exceeding $1,200 for the maintenance, repair, and operation of one motor-driven and one horse-drawn passenger-carrying vehicle for the use of the superintendent and employees in connection with general park work, $80,000.

Yosemite National Park, California: For protection and improvement, construction and repair of bridges, fences, and trails, and improvement of roads other than toll roads; including not exceeding $1,000 for purchase, maintenance, operation, and repair of two motorcycles, not exceeding $800 for maintenance, operation, and repair of horse-drawn and motor-driven passenger-carrying vehicles for use of the superintendent and employees in connection with general park work, not exceeding $15,000 for a bridge at the old Sentinel Bridge site, and not exceeding $75,000 for grading in width not exceeding twenty feet El Portal-Yosemite Road, $255,000.

Sequoia National Park, California: For protection and improvement, construction and repair of bridges, fences, and trails, improvement of roads other than toll roads, including not exceeding $1,200 for the purchase, maintenance, operation, and repair of a motor-driven passenger-carrying vehicle for the use of the superintendent and employees in connection with the general park work; and not exceeding $12,000 for a bridge at the old Marble Fork bridge site, $30,510.

General Grant National Park, California: For protection and improvement, construction of fences and trails, and repairing and extension of roads, $4,500.

Mount Rainier National Park, Washington: For protection and improvement, construction of roads, bridges, fences, and trails, and improvement of roads, including not exceeding $500 for the maintenance, operation, and repair of a motor-driven passenger-carrying vehicle for use of the superintendent and park employees in connection with general park work, $24,600.

Mesa Verde National Park, Colorado: For protection and improvement, including not exceeding $433 for maintenance, operation, and repair of horse-drawn passenger-carrying vehicle for use of the superintendent and employees, $18,000.

Rocky Mountain National Park, Colorado: For protection and improvement, $10,000.

Crater Lake National Park, Oregon: For protection and improvement, and repairing and extension of roads, including not exceeding $1,200 for the purchase, maintenance, operation, and repair of a motor-driven passenger-carrying vehicle for the use of the superintendent and employees in connection with general park work, $13,225.

Wind Cave National Park, South Dakota: For improvement and protection, $4,000.

Platt National Park, Oklahoma: For improvement and protection, $7,500.

National Monuments: For the preservation, development, administration, and protection of the national monuments, to be expended under the direction of the Secretary of the Interior, $10,000.

Hawaii National Park: For expenses incident to securing donations of patented lands and rights of way over patented lands in Hawaii National Park, $750.

Sieur de Monts National Monument, Maine: For protection and improvement, including not exceeding $1,400 for purchase, maintenance, operation, and repair of a motor-driven passenger-carrying vehicle for use of rangers in administration of the monument, $10,000.

Hot Springs Reservation, Arkanses: For labor, material, supervision, clearing site, and all other necessary expenses incident to the construction of a new administration and Government free bathhouse building, to cost not to exceed $190,000, there is appropriated $140,000, and in addition thereto $50,000 is authorized to be expended therefor from the revenues received from the said reservation.

WAR DEPARTMENT.

ENGINEER DEPARTMENT.

Crater Lake National Park, Oregon: For construction and maintenance of a wagon road and the necessary bridges through the park, together with a system of tanks and water-supply pipes for sprinkling, in accordance with the recommendations in House Document Numbered Three hundred and twenty-eight, Sixty-second Congress, second session, and for maintenance, repair, and operation of two horse-drawn passenger-carrying vehicles, to be expended under the direction of the Secretary of War, $50,000.

Approved Jul [illegible] [Public, No. 181, 65th Congress.]

PRESIDENTIAL PROCLAMATIONS.

ZION NATIONAL MONUMENT, UTAH.

BY THE PRESIDENT OF THE UNITED STATES OF AMERICA.

A PROCLAMATION.

Whereas is has been established by the research of competent observers that certain lands directly bordering upon the Mukuntuweap National Monument, reserved by proclamation dated July 31, 1909, said monument and adjacent lands being in the State of Utah, contain many natural features of unusual archaelogic, geologic, and geographic interest, unknown at the time the monument was created;

And whereas the archaeologic features pertain to the prehistoric races of America and to the ancestral Indian tribes;

And whereas the geologic features include craters of extinct volcanoes, fossiliferous deposits of unusual nature, and brilliantly colored strata of unique composition, among which are some believed to be the best representatives in the world of a rare type of sedimentation;

And whereas the features of geographic interest include a labyrinth of remarkable canyons with highly ornate and beautifully colored walls, in which are plainly recorded the geologic events of past ages;

And whereas it appears that the entire area herein referred to should be preserved intact for the purpose of scientific research and for the enjoyment and enlightenment of the public;

And whereas the canyon of the North Fork of the Virgin River, the principal natural feature of geologic and geographic interest included within the boundaries of the said Mukuntuweap National Monument, was named "Zion Canyon" by Mormon settlers many years before the name "Mukuntuweap" was given to the region because it was regarded as a safe refuge in the event of Indian attacks on neighboring settlements;

And whereas the name "Zion" is still applied to this region to the exclusion of the name "Mukuntuweap";

And whereas it is desirable that the national monument embracing said region shall bear the generally accepted name "Zion":

Now, therefore, I Woodrow Wilson, President of the United States of America, by virtue of the power and authority in me vested by section two of the act of Congress entitled "An act for the preservation of American antiquities," approved June 8, 1906 (34 Stat., 225), do proclaim that there are hereby reserved from all forms of appropriation under the public-land laws, and set apart as the Zion National Monument, certain tracts of land particularly described as follows, to wit, all of township forty south, range ten west; all of township forty south, range ten and one-half west, with the exceptions of sections one and two; sections one, eleven, twelve, thirteen, fourteen, twenty-three, twenty-four, twenty-five, twenty-six, thirty-five, and thirty-six of township forty south, range eleven west; sections one, two, three, ten, eleven, twelve, thirteen, fourteen, fifteen, twenty-two, twenty-three, twenty-four, twenty-five, twenty-six, and twenty-seven of township forty-one south, range eleven west; and sections one, two, three, four, five, six, seven, eight, nine, ten, eleven, twelve, thirteen, fourteen, fifteen, sixteen, seventeen, eighteen, nineteen, twenty, the north half and southeast quarter of twenty-two, twenty-three, twenty-four, twenty-five, twenty-six, the south half and northeast quarter of twenty-seven, thirty, thirty-four, thirty-five, and thirty-six of township forty-one south, range ten, all west of the Salt Lake Meridian in the State of Utah, which tracts include the lands embraced in the Mukuntuweap National Monument as reserved by the proclamation of July 31, 1909, and that the boundaries of said Zion National Monument are as shown on the diagram hereto attached and made a part hereof.

Warning is hereby given to all unauthorized persons not to appropriate or injure any natural feature of this monument or to occupy, exploit, settle, or locate upon any of the lands reserved by this proclamation.

The Director of the National Park Service, under the direction of the Secretary of the Interior, shall have the supervision, management, and control of this monument, as provided in the act of Congress entitled "An act to establish a National Park Service, and for other purposes," approved August 25, 1916 (39 Stat., 535).

In witness whereof, I have hereunto set my hand and caused the seal of the United States to be affixed.

Done in the District of Columbia this eighteenth day of March, in the year of our Lord one thousand nine hundred and eighteen, and of the independence of the United States of America the one hundred and forty-second.

[SEAL.] WOODROW WILSON.

By the President:

ROBERT LANSING,
Secretary of State.

[No. 1435.]

CASA GRANDE NATIONAL MONUMENT, ARIZONA.

BY THE PRESIDENT OF THE UNITED STATES OF AMERICA,

A PROCLAMATION.

Whereas, by authority of the act of Congress approved March 2, 1889 (25 Stat., 961), there was set aside and reserved by Executive order dated June 22, 1892, certain land in the State of Arizona on which is located the prehistoric ruin known as Casa Grande, the boundaries of which reservation were later amended by proclamation of December 10, 1909 (36 Stat., 2504); and

Whereas it is in the public interest that this reservation be made a national monument under authority of the act of Congress entitled "An act for the preservation of American antiquities," approved June 8, 1906 (34 Stat., 225), in order that better provision may be made for the protection, preservation and care of the ruins of the ancient buildings and other objects of prehistoric interest thereon:

Now, therefore, I, Woodrow Wilson, President of the United States of America, by virtue of the power in me vested by section two of the aforesaid act of Congress, do proclaim as the Casa Grande National Monument the land heretofore reserved and set aside as aforesaid, to wit: The northwest quarter, the northeast quarter, the north half of the southwest quarter, and the north half of the southeast quarter of section sixteen, township five south, range eight east, Gila and Salt River meridian, State of Arizona, the boundaries of said national monument being as shown on diagram annexed to said proclamation of December 10, 1909 (36 Stat., 2504), which diagram is made a part hereof.

Warning is hereby expressly given to all unauthorized persons not to appropriate, injure, remove, or destroy any feature of this national monument, or to locate or settle on any of the lands reserved by this proclamation.

The Director of the National Park Service, under the direction of the Secretary of the Interior, shall have supervision, management, and control of this monument, as provided in the act of Congress entitled "An act to establish a National Park Service, and for other purposes," approved August 25, 1916 (39 Stat., 535).

In testimony whereof, I have hereunto set my hand and caused the seal of the United States to be affixed.

Done in the District of Columbia this 3d day of August in the year of our Lord one thousand nine hundred and eighteen, and of the independence of the United States of America the one hundred and forty-third.

[SEAL.] WOODROW WILSON.

By the President:

FRANK L. POLK,
Acting Secretary of State.

[No. 1470.]

KATMAI NATIONAL MONUMENT, ALASKA.

BY THE PRESIDENT OF THE UNITED STATES OF AMERICA.

A PROCLAMATION.

Whereas there exists upon the southern coast of Alaska a belt of unusual volcanic activity which has during the last several years exhibited at various points energy of a violence which attracts the special attention of scientific watchers;

And whereas, Mount Katmai, one of the volcanoes in this belt, has proved upon investigation to have unusual size and character, and to be of importance in the study of volcanism, inasmuch as its eruption of June, 1912, was one of excessive violence, ranking in the first order of volcanic explosive eruptions and emitting several cubic miles of material during its first three days of activity.

And whereas the results of this eruption are still fresh, offering excellent opportunities for studying the causes of the catastrophe and its results and affording a conspicuous object lesson in volcanism to visitors interested in the operation of the great forces which have made and still are making America;

And whereas the volcanic neighborhood is shown by the explorations of the National Geographic Society to contain many other striking features of an active volcanic belt produced so recently that they are still in the formative stage; and in particular The Valley of the Ten Thousand Smokes, a valley of hot springs in a condition of development toward a possible future geyser field, in distinction from the present dying geyser field of the Yellowstone;

And whereas this wonderland may become of popular scenic, as well as scientific, interest for generations to come, inasmuch as all its phenomena exist upon a scale of great magnitude, arousing emotions of wonder at the inspiring spectacles, thus affording inspiration to patriotism and to the study of nature:

Now, therefore, I, Woodrow Wilson, President of the United States of America, by virtue of the power and authority in me vested by section two of the act of Congress entitled "An act for the preservation of American antiquities," approved June 8, 1906 (34 Stat., 225), do proclaim that there are hereby reserved from all forms of appropriation under the public-land laws, and set apart as the Katmai National Monument, certain lands particularly described as follows, to wit: Beginning at the United States Coast and Geodetic Survey triangulation station, latitude 57° 52′ 17.040″, longitude 155° 05′ 20.331″, established in 1908 about one-half mile west of Katmai Bay on top of a hundred-foot bluff on the Alaska Peninsula, named Cape Kubugakli; thence north 40° 00′ west to the intersection with longitude 155° 40′; thence due north to the intersection with latitude 58° 35′; thence due east to the intersection with a line bearing north 60° 00′ west from Cape Gull; thence south following said line to the shore line at Cape Gull; thence west following the shore line of the coast to a point directly below the triangulation station, situated on the bluff at Cape Kubugakli; thence up the bluff to the said station, the point of beginning; embracing approximately 1,700 square miles of land, as shown upon the diagram hereto attached and made a part of this proclamation.

Warning is hereby given to all unauthorized persons not to appropriate or injure any natural feature of this monument or to occupy, exploit, settle, or locate upon any of the lands reserved by this proclamation.

The Director of the National Park Service, under the direction of the Secretary of the Interior, shall have the supervision, management, and control of this monument, as provided in the act of Congress entitled "An act to establish a National Park Service, and for other purposes," approved August 25, 1916 (39 Stat., 535).

In witness whereof I have hereunto set my hand and caused the seal of the United States to be affixed.

Done in the District of Columbia this 24th day of September in the year of our Lord one thousand nine hundred and eighteen, and of the independence of the United States of America the one hundred and forty-third.

[SEAL.] WOODROW WILSON.

By the President:
ROBERT LANSING,
Secretary of State.

[No. 1487.]

EXECUTIVE ORDERS.

EXECUTIVE ORDER.

CALIFORNIA.

Under authority of the act of Congress approved June 25, 1910 (36 Stat. 847), as amended by the act of August 24, 1912 (37 Stat., 497), it is hereby ordered that the public lands in the following described areas be temporarily withdrawn from settlement, location, sale or entry, subject to the provisions of the aforesaid acts in aid of pending legislation embodied in bills S. 2021 and H. R. 10929, Sixty-fifth Congress, to wit:

Beginning at a point on the east boundary line of the Sequoia National Park which is on the range line between ranges thirty-one and thirty-two east of the Mount Diablo meridian, in township eighteen south of the Mount Diablo base, California, where said range line intersects the hydrographic divide between Little Kern River and Soda Creek; then southeasterly along the hydrographic divide between Little Kern River and Soda Creek to the junction of Little Kern River and Quail Creek; thence easterly along the hydrographic divide between Quail Creek and Lion Creek to the summit of the Great Western Divide; thence southeasterly along the Great Western Divide to Coyote Peak (United States Geological Survey bench mark ten thousand nine hundred and nineteen feet); thence easterly along the hydrographic divide through sections thirty-one and thirty-two, township eighteen south, range thirty-three east, and section four, township nineteen south, range thirty-three east, to the junction of Kern River and Little Creek, about one-quarter mile south of Kern Lake and between that lake and Little Lake; thence easterly along the main divide south of Little Creek and between Golden Trout Creek and Cold Creek (tributaries of Kern River) to the summit of Kern Peak (United States Geological Survey bench mark eleven thousand four hundred and ninety-three feet, triangulation station); thence northerly and easterly along the hydrographic divide between the South Fork of Kern River and Golden Trout Creek to the summit of the Sierra Nevada Mountains; thence northerly and westerly along the main crest of the Sierra Nevada Mountains to Pine Creek Pass, at the head of a tributary of Piute Creek, which flows southwesterly through French Canyon; thence following southwesterly down west bank of said creek through French Canyon and continuing along west bank of Piute Creek to the junction of the South Fork of San Joaquin River and Piute Creek; thence southerly along the main hydographic divide to the summit of Mount Henry (twelve thousand one hundred and ninety-seven feet); thence southeasterly along the hydrographic divide between the drainage of the South Fork of San Joaquin River and the drainage of the North Fork of Kings River to the junction with Goddard Divide; thence southerly and westerly along the hydrographic divide between Goddard Creek and the drainage of the North Fork of Kings River, and along the divide between Crown Creek and Blue Canyon Creek, along Kettle Ridge to Kettle Dome; thence southwesterly along the hydrographic divide to the junction of Crown and Fawn Creeks; thence westerly along the hydrographic divide between Fawn Creek and Rodgers Creek to Obelisk Peak; thence westerly along the main hydrographic divide south of Rodgers Creek to Spanish Mountain (triangulation station, United States Geological Survey bench mark ten thousand and forty-four feet); thence southerly along the hydrographic divide (Deer Ridge) to the junction of the South and Middle Forks of Kings River; thence southerly along the hydrographic divide between Ten-mile Creek and Lockwood Creek and along the Sequoia and Big Baldy Ridges to Big Baldy (triangulation station, United States Geological Survey, bench mark eight thousand two hundred and eleven feet); thence continuing southerly along the said hydrographic divide (Big Baldy Ridge) to the northwest corner of the Sequoia National Park, which is approximately on or near said hydrographic divide, between townships fourteen and fifteen south, ranges twenty-eight and twenty-nine east; thence east along the north boundary to the northeast corner of said national park; thence south along the east boundary to the point of beginning.

Beginning at that point on the west boundary line of the Sequoia National Park where it is intersected by the hydrographic divide between Redwood Creek and North Fork Kaweah River in township fifteen south, range twenty-eight east; thence southerly along the said hydrographic divide to the junction of Redwood Creek and the North Fork Kaweah River; thence following down the west bank of the North Fork Kaweah River to the junction with Cactus Creek; thence southeasterly along the first main hydrographic divide south of Cactus Creek to where it intersects the west boundary line of the said national park, township sixteen south, range twenty-eight east; thence north along the said west boundary to the point of beginning.

Beginning at that point on the west boundary line of the Sequoia National Park where it is intersected by the hydrographic divide west of Alder Creek, between townships sixteen and seventeen south, range twenty-nine east; thence southeasterly along said hydrographic divide to the junction of the Middle and East Forks Kaweah River; thence south and easterly along the hydrographic divide between the East Fork Kaweah River and Salt Creek, over Red Hill, to Case Mountain; thence southerly and easterly along the hydrographic divide (Salt Creek Ridge) between the South and East Forks Kaweah River to where it intersects the west boundary line of said national park, township eighteen south, ranges twenty-nine and thirty east; thence north and west along the said west boundary to the point of beginning.

Beginning at that point on the west boundary line of the Sequoia National Park, where it is intersected by the hydrographic divide east of Burnt Camp Creek, township eighteen south ranges twenty-nine and thirty east; thence westerly along said hydrographic divide to the junction of Burnt Camp Creek and the South Fork Kaweah River; thence southeasterly along the hydrographic divide toward Dennison Mountain, to where it intersects the west boundary of said national park, township eighteen south, ranges twenty-nine and thirty east; thence north along the said west boundary to the point of beginning.

WOODROW WILSON.

THE WHITE HOUSE, *July 8, 1918.*

[No. 2906.]

EXECUTIVE ORDER.

WYOMING.

Under authority of the act of Congress approved June 25, 1910 (36 Stat., 847), as amended by the act of August 24, 1912, (37 Stat., 497), it is hereby ordered that the public lands in the following described area be temporarily withdrawn from settlement, location, sale or entry, subject to the provisions of the aforesaid acts in aid of pending legislation embodied in bill H. R. 11661, 65th Congress, to wit:

Beginning at a point on the present south boundary line of the Yellowstone National Park where it is intersected by the Idaho-Wyoming State line, thence south along the Idaho-Wyoming State Line to its intersection with the hydrographic divide between Conant Creek and North Fork Pierre River; thence easterly along the said hydrographic divide and now between Conant and Birch Creeks to the main hydrographic divide formed by the Teton Mountains, and between the headwaters of Berry and Conant Creeks; thence south along said hydrographic divide and now between Birch and Owl Creeks, North Fork Pierre River and Webb Canyon, Badger Creek and Moran Canyon, Leigh Creek and Leigh Canyon, and Teton Canyon and Glacier Creek to a peak, elevation eleven thousand four hundred feet, on the said hydrographic divide, between the headwaters of Teton Canyon and Taggart Creek and a branch of Death Canyon waters, which enter said Death Canyon about one and one-half miles northwest of Phelps Lake; thence following easterly along the main hydrographic divide south of Taggart Creek and Taggart Lake to its intersection with the unsurveyed section line between, what will be be when surveyed sections ten and fifteen, township forty-three north, range one hundred and sixteen west of the sixth principal meridian; thence east along the said section line and continuing east along the section line between sections eleven and fourteen of said township and range to the southeast corner of the southwest quarter of section eleven, said township and range; thence north to the northeast corner of the northwest quarter of section two, said township and range; thence east to the southeast corner of the southwest quarter of the southeast quarter of section thirty-five in unsurveyed township forty-four north, range one hundred and sixteen west; thence north to the northeast corner of the southwest quarter of the southeast quarter of section thirty-five; thence west to the northeast corner of the southwest quarter of the southwest quarter of section thirty-five; thence north to the northeast corner of the northwest quarter of the northwest quarter of section thirty-five; thence east to the southeast corner of the southwest quarter of section twenty-six; thence north to the northeast corner of the southeast quarter of the southwest quarter of section twenty-six; thence east to the southeast corner of the northwest quarter of the southwest quarter of section twenty-five; thence north to the northeast corner of the northwest quarter of the southwest quarter of section twenty-five; thence east to the southeast corner of the southeast quarter of the northwest quarter of section twenty-five; thence north to the northeast corner of the southeast quarter of the northwest quarter of section twenty-five; thence east to the southeast corner of the northwest quarter of the northeast quarter of section twenty-five; thence north to the northeast corner of the southwest quarter of the northeast quarter of section thirteen; thence west to the northwest corner of the southwest quarter of the northwest quarter of section thirteen; thence north to the southwest corner of the northwest quarter of the southwest quarter of section twelve; thence east to the southeast corner of the northwest quarter of the southwest quarter of section twelve; thence north to the northeast corner of the northwest quarter of the southwest quarter of section twelve; thence east to the southeast corner of the northwest quarter of section twelve; thence north to the southeast corner of the northeast quarter of the northwest quarter of section twelve; thence east to the southeast corner of the northwest quarter of the northeast quarter of section twelve; thence north to the northeast corner of the northwest quarter of the northeast quarter of section twelve; thence east to the southeast corner of section one; all in unsurveyed township forty-four north, range one hundred and sixteen west; thence east along the section lines between section six and seven, five and eight, four and nine, and three and ten to the southeast corner of the southwest quarter of section three, all in township forty-four north, range one hundred and fifteen west; thence north to the northeast corner of the northwest quarter of section three, said township and range; thence east along the township line to the southeast corner of the southwest quarter of the southwest quarter of section thirty-six, township forty-five north, range one hundred and fifteen west; thence north to the northeast corner of the northwest quarter of the southwest quarter of section thirty-six, said township and range; thence east to the southwest corner of the northwest quarter of section thirty-four, township forty-five north, range one hundred and fourteen west; thence south along the section line between sections thirty-three and thirty-four, said township and range, to its intersection with the southeast bank of Snake River; thence northerly along the southeastern bank of Snake River to its intersection with the Buffalo Fork; thence easterly along the south bank of Buffalo Fork to the junction with a tributary of said Buffalo Fork approximately in unsurveyed section six of partially surveyed township forty-five north, range one hundred and nine west; thence easterly following up the main hydrographic divide between said tributary and Buffalo Fork to U S. Geological Survey bench mark, elevation ten thousand five hundred and ninety-nine feet; thence northeasterly continuing along the divide, passing over Buffalo Plateau to the Continental Divide; thence northeasterly following the Continental Divide to the hydrographic divide formed by the Absaroka Range between the headwaters of Deer Creek, Buffalo Fork, and Yellowstone River; thence northeasterly continuing along the said hydrographic divide between Thorofare and Bruin Creeks and Deer, Red, Yellow, Tall, and Cabin Creeks, headwaters of Shoshone River, to Kingfisher Peak, elevation eleven thousand one hundred feet; thence northwesterly along the hydrographic divide between Butte and Pass Creeks and Deer and Ishawooa Creeks, passing over Ishawooa Pass, elevation nine thousand eight hundred and seventy feet, to Ishawooa Cone, elevation eleven thousand eight hundred and forty feet; thence northwesterly along the hydrographic divide between Open, Mountain, and Dike Creeks, and Rampart, Fishhawk, Eyrie, and Eagle Creeks, passing over Overlook Mountain, elevation eleven thousand eight hundred feet; Chaos Mountain, elevation eleven thousand five hundred feet; and Pinnacle Mountain, elevation eleven thousand four hundred feet, to a point on the present east boundary line of the Yellowstone National Park, in the State of Wyoming, which is about three-fourths mile south of the boundary monument, marked six north; thence south along the present east boundary line to the southeast corner of Yellowstone Park; thence west along the present south boundary line to the point of beginning.

WOODROW WILSON.

THE WHITE HOUSE, *July 8, 1918.*

[No. 2905.]

REPORTS ON LEGISLATION.

[Senate Report No. 321, Sixty-fifth Congress, second session.]

GRAND CANYON NATIONAL PARK.

MARCH 21, 1918.—Ordered to be printed.

Mr. SMITH of Arizona, from the Committee on Public Lands, submitted the following report (to accompany S. 390):

The Committee on Public Lands, to which was referred the bill (S. 390) to establish the Grand Canyon National Park in the State of Arizona, having had the same under consideration, begs leave to report it back to the Senate with amendments and as amended recommends that the bill do pass.

The bill was referred to the Department of the Interior, and the Secretary of the department furnished the committee with the following report thereon:

DEPARTMENT OF THE INTERIOR,
Washington, February 5, 1918.

MY DEAR SENATOR: I have your request for a report on S. 390, "A bill to establish the Grand Canyon National Park in the State of Arizona." This measure is identical with S. 8250, Sixty-fourth Congress, which received the favorable consideration of your committee in February, 1917 (S. Rept. No. 1082, 64th Cong.). In indorsing S. 8250 and recommending its early passage I made the following observations which are, of course, equally applicable to the pending bill:

"The area proposed to be set aside and dedicated as a national park by this measure, embraces approximately 996 square miles of public land now constituting part of the Kaibab and Tusayan National Forests, in northern Arizona. A large part of it also lies within the Grand Canyon Game Refuge, established by the act of June 29, 1906 (34 Stat., 607), and the Grand Canyon National Monument set aside by presidential proclamation January 11, 1908, under the act of June 8, 1906 (34 Stat., 225), covers practically the entire area, thus constituting a third and paramount reservation of these lands.

"In the very nature of things, however, the Grand Canyon can not, as a section of two national forests, a game refuge, or a national monument, be properly developed for the public benefit, and it can not be effectively administered or adequately protected.

"While the south rim of the canyon has, to a small extent, been made available to the traveling public, and many thousands of tourists have thus had the opportunity of visiting certain of its scenic features, private enterprise alone, operating under extraordinary difficulties, has accomplished this development. I am informed that 106,000 tourists visited the south rim of the Grand Canyon during the calendar year 1915, but, due to lack of roads, trails, side-trip destination, etc., this vast throng found little opportunity to obtain a full measure of enjoyment of the marvelous grandeur of this region.

"It seems to be universally acknowledged that the Grand Canyon is the most stupendous natural pheonomenon in the world. Certainly it is the finest example of the power and eccentricity of water erosion, and as a spectacle of sublimity it has no peer.

"It would be futile to attempt to describe the Grand Canyon. However, a review of a few facts with relation to the canyon would be pertinent to a report of this character.

"The Colorado River, which flows through the gorge, drains a territory of 300,000 square miles, and it is 2,000 miles from the source of its principal tributary to its entrance into the Gulf of California. It is one of America's greatest rivers. It is proposed by this bill to establish a national park at the point in the river's course where it has worn a channel more than a mile deep. This enormous gulf measures occasionally 20 miles across the top.

"The sides of the gorge are wonderfully shelved and terraced, and countless spires rise within the enormous chasm, sometimes almost to the rim's level. The walls and cliffs are carved into a million graceful and fantastic shapes, and the many-colored strata of the rocks through which the river has shaped its course have made the canyon a lure for the foremost painters of American landscapes.

* * * * * * *

"It seems that the Grand Canyon, therefore, is entitled to the same status and to an equal degree of consideration by Congress as are enjoyed by Yellowstone, Yosemite, and the other great national parks which contain natural phenomena of the first order, and I heartily recommend immediate favorable action looking toward the enactment of this bill."

I have but one criticism to make of the text of the pending bill. Section 7 is not in harmony with the other general provisions of the measure, and should be changed to read as follows:

"SEC. 7. That, whenever consistent with the primary purposes of said park, the Secretary of the Interior is authorized to permit the utilization of areas therein which may be necessary for the development and maintenance of a Government reclamation project."

With this alteration the bill will be complete in every particular and will give this department ample authority to protect, improve, and administer the Grand Canyon and otherwise advance its interests along the lines now employed in the development of the other members of the park system.

In again urging the early enactment of this legislation I would reiterate and emphasize the fact that the Grand Canyon, while a great national asset whether viewed from the standpoint of scenery, recreation, or American business enterprise, has not been developed by the Federal Government, and all that has been done to open this marvelous region to the people has been accomplished by private resources. It should now be given its rightful place in the Nation's splendid system of magnificent and distinctive natural parks and developed, after the war is over, in accordance with a reasonable and progressive policy which this department may formulate for submission to Congress at the proper time and through the proper channels. For the reason that such development is absolutely necessary I hope that your committee or the Congress will place no inhibition on the amount of public funds that the proper committees of the two Houses may annually recommend for appropriation without special authority of law.

It was 32 years ago on January 5, 1886, that the first bill to make the Grand Canyon a national park was introduced in the Senate by the late ex-President Benjamin Harrison, then a Senator from Indiana. This was in the Forty-ninth Congress. The project has been presented to the Congress from time to time since 1886, and it appears that there never has been a valid objection advanced against it. Nor can such an objection be urged, because the Grand Canyon belongs to the Federal Government and any attempt to thwart a change in its status, which would distinctly rebound to its advantage, must be made by some private interest.

I am so thoroughly convinced of the importance of this park project that I do not hesitate to urge its consideration in the present session of the Congress.

Cordially, yours,

FRANKLIN K. LANE, *Secretary.*

Hon. H. L. MYERS,
Chairman Committee on Public Lands, United States Senate.

The demand for the creation of this park has been very insistent for many years, and in the bill as reported with amendments proposed by the committee due regard has been given to the rights of the citizens of Arizona and of the individual property owners within the park boundaries. The rights of Coconino County to collect tolls over the Bright Angel Trail have been specifically recognized. The committee, however, is inclined to the view that toll roads should not exist within a national park, and therefore an amendment is suggested looking toward arrangements for the acquisition of the trail in question.

This park under the proposed bill represents an area of approximately 950 square miles, a greater part of which is within the walls of the canyon. Sufficient land has been included back of the north and south rims to make possible an adequate road development and to take care of camping and hotel facilities.

The Grand Canyon has long been recognized as one of the greatest scenic regions of the world, and it is even quite generally regarded as a national park, although it has never been managed as a part of the park system and has never been susceptible of development as such. It is eminently fitting and proper that this magnificent gorge should now take its place as a link in the national-park chain which already includes most of the Nation's wonderful and extraordinarily distinctive natural features.

[Senate Report No. 503, Sixty-fifth Congress, second session.]

MOUNT DESERT NATIONAL PARK, ME.

JUNE 14, 1918.—Ordered to be printed.

Mr. MYERS, from the Committee on Public Lands, submitted the following report (to accompany S. 4569):

The Committee on Public Lands, to which was referred the bill (S. 4569) to establish the Mount Desert National Park in the State of Maine, having had the same under consideration, begs leave to report it back to the Senate with the recommendation that the bill do pass.

The bill was referred to the Department of the Interior, and the Secretary of the department furnished the committee with the following report thereon:

DEPARTMENT OF THE INTERIOR,
Washington, May 29, 1918.

MY DEAR SENATOR: I have your request of May 22 for a report on S. 4569, "A bill to establish the Mount Desert National Park in the State of Maine."

This bill is identical in every respect with H. R. 11935, now pending in the Public Lands Committee of the House of Representatives. On May 15 Secretary Lane submitted a favorable report on the House measure, and I am inclosing a copy of this report for the use of your committee.

I am also inclosing a map of the Mount Desert Island, on which the proposed park areas have been clearly indicated.

Cordially, yours,

ALEXANDER T. VOGELSANG,
Acting Secretary.

Hon. H. L. MYERS,
Chairman, Committee on Public Lands, United States Senate.

DEPARTMENT OF THE INTERIOR,
Washington, May 15, 1918.

MY DEAR MR. FERRIS: I have your request of May 6, 1918, for a report on H. R. 11935, "A bill to establish the Mount Desert National Park in the State of Maine."

While this measure proposes to create a new member of the national park system, its effect, if enacted into law, would be to merely change the name of the Sieur de Monts National Monument and promote this area to the national park status, at the same time adequately providing for its extension and development along well-defined lines. As this monument is already under the jurisdiction of this department, and immediately under the control of the National Park Service, by virtue of the act of August 25, 1916, the national park service act (39 Stat., 535), the only important question involved in this legislation is whether the monument lands are worthy of advancement to the national park class. I believe that the national park should be established for the following reasons:

First: Mount Desert Island has important historic value. It is the place where Champlain first landed on this coast, and the French had a station here years before the landing of the Pilgrim Fathers.

Second: Scenically its impressive headlands give Mount Desert the distinction of combining sea and mountain. These headlands are by far the loftiest of our Atlantic coast. Their high, rounded summits, often craggy, and their splendid granite shelves form a background for a rugged shore line and an island-dotted harbor which is one of the finest that even the Maine coast can present. Back of the shore is a mountain and lake wilderness which is typical in a remarkable degree of the range of Appalachian scenery.

Third: From the point of view of conservation, the value of the proposed park can hardly be overestimated. The forests are largely primeval. Oaks, beeches, birches, maples, ashes, poplars, and many other deciduous trees of our eastern ranges, here found in full luxuriance, mingle with groves of pine and giant hemlock. The typical shrubs of northeastern America are in equal abundance. Wild flowers abound. There are few spots, if any, which can combine the variety and luxuriance of the eastern forests in such small compass.

The rocks have their distinction. This was the first part of the continent to emerge from the prehistoric sea. Archean granites in original exposure such as these, though common in eastern Canada, are rare in the United States. Worn by the ice sheets of the glacial period, eroded by the frosts and rains of the ages, their bases carved by the sea, their surfaces painted by the mosses and lichens of to-day, they are exhibits of scientific interest as well as beauty.

Still another distinction is Mount Desert's wealth of bird life. All of the conditions for a bird sanctuary in the East seem to be here fulfilled. Once Mount Desert was the home of many deer, some of which are now returning from the mainland. Moose haunt it still occasionally. Once its streams abounded in beaver, and will again after a few of these animals are planted in its protected valleys.

Fourth. From a recreational standpoint, the Mount Desert Park would be capable of giving pleasure in the summer months to hundreds of thousands of people living east of the Mississippi River. Last year it was visited by more than 50,000 individuals. The island is accessible by automobile, railroad, and boat, and is only a relatively few hours distant from any large eastern cities. Developed as a national park in the interest of all the people, this reservation will become one of the greatest of our public assets.

The Sieur de Monts National Monument was established by proclamation of the President, July 8, 1916, under the act of June 8, 1906, "An act for the preservation of American antiquities" (34 Stat., 225). A copy of this proclamation is inclosed.

The area of the monument is approximately 5,000 acres. All of this land was secured by purchase, or through donation, by the Hancock County trustees of public reservations, was conveyed, by this corporation to the United States and accepted by me under the authority of the monuments act. Since the establishment of the reservation, additional tracts of land to the extent of 5,000 acres have been secured and tendered to the Government. I have indicated that I will accept these lands as soon as the deeds and other instruments of title have been examined and found satisfactory in all respects. The reservation, therefore, may be regarded as having a total area of approximately 10,000 acres. Ultimately this will be extended to 20,000 acres through the continued efforts of the public-spirited gentlemen who are devoting their time and personal funds to the development of this park enterprise.

I have no criticism to make of the form of the pending bill, and I hope that the committee may give it early and favorable consideration.

Cordially, yours,

FRANKLIN K. LANE,
Secretary.

Hon. SCOTT FERRIS,
Chairman Committee on the Public Lands,
House of Representatives.

[Senate Report No. 576, Sixty-fifth Congress, second session.]

LAFAYETTE NATIONAL PARK.

OCTOBER 3, 1918.—Ordered to be printed.

Mr. MYERS, from the Commttee on Public Lands, submitted the following report (to accompany S. 4957):

The Committee on Public Lands, to which was referred the bill (S. 4957) to establish the Lafayette National Park in the State of Maine, having had the same under consideration, begs leave to report it back to the Senate with the recommendation that the bill do pass.

The bill was referred to the Department of the Interior, and the Secretary of the department furnished the committee with the following report thereon:

DEPARTMENT OF THE INTERIOR,
Washington, October 2, 1918.

MY DEAR SENATOR: I have your request of September 26 for report upon Senate bill 4957, the purpose of which is to establish the Lafayette National Park in the State of Maine. This bill is in all respects, except that of name, identical with a bill which has heretofore passed the Senate, during the present session, and I attach a copy of my report upon that bill.

The name of Lafayette is substituted for that of Mount Desert, the name proposed by the former bill, and I consider it singularly appropriate that the name of Lafayette should be commemorated by these splendid mountains facing on the sea on what was once a corner of Old France, and with it the early friendship of the two nations which are so closely allied in the present war. Already this land, as a portion of old French Acadia, is associated with some of the most famous names of France: Henry of Navarre, De Monts, Champlain, Cadillac, and others.

Lafayette's name is dear to the American people and it will be a gracious act toward France to commemorate his name by giving it to this new national park.

Cordially, yours,

FRANKLIN K. LANE,
Secretary.

Hon. HENRY L. MYERS,
Chairman Committee on Public Lands,
United States Senate.

[House Report No. 374, Sixty-fifth Congress, second session.]

ROCKY MOUNTAIN NATIONAL PARK, COLO.

MARCH 12, 1918.—Referred to the House Calendar and ordered to be printed.

Mr. TIMBERLAKE, from the Committee on the Public Lands, submitted the following report (to accompany H. R. 171):

The Committee on the Public Lands, to whom was referred the bill (H. R. 171) to repeal the last proviso of section 4 of an act to establish the Rocky Mountain National Park, in the State of Colorado, and for other purposes, approved January 26, 1915, having had the same under consideration, begs to report the same back to the House with the recommendation that the same be amended as follows, to wit:

After the word "the," in line 11, insert the word "same," and that the bill as amended do pass.

The bill was referred to the Interior Department, and the Secretary of that department furnished the committee with the following report thereon:

DEPARTMENT OF THE INTERIOR,
Washington, February 16, 1918.

MY DEAR MR. FERRIS: I have received your letter of February 14, 1918, requesting report on H. R. 171, "A bill to repeal the last proviso of section 4 of an act to establish the Rocky Mountain National Park, in the State of Colorado, and for other purposes, approved January 26, 1915."

The organic act establishing the Rocky Mountain National Park set apart from the public domain an area of 229,062 acres in a section of the Rocky Mountains which contains scenery of unsurpassed grandeur, and it has been recognized ever since its creation as one of the most important members of the national park system.

On account of the inhibition on the amount of the public funds that might be appropriated for this park without special authority of the Congress, which the bill under consideration proposes to repeal, not more than $10,000 has been available in the course of a fiscal year for the administration, protection, and improvement of this vast mountainous area. Practically all of the funds that have been appropriated have been expended, necessarily, in the administration and protection of the park, and it has been quite impossible to undertake more than minor improvements in the trails and telephone lines. We have never been able to allot funds for road work or for the construction of new trails. Only one small building has been erected since the park was established.

The act of February 14, 1917 (39 Stat., 916), extended the park boundaries eastward, adding 25,265 acres and bringing the total area to 254,327 acres. This enlargement of the park brought new problems of traffic control, camp supervision, sanitation, fire protection, and other important problems requiring an increase in the ranger force and the assumption of other financial burdens without proportionate increase in appropriations to meet these new obligations. We therefore find that our appropriation is now just sufficient for the administration and protection of the park, and it is doubtful if we can hereafter perform any maintenance work on the trails or other improvements until the inhibition governing the annual appropriations is removed.

It is also important to note that Rocky Mountain National Park enjoys a very large tourist patronage. During the past season over 117,000 people, coming from nearly every State in the Union, visited the park, and I see no reason why its popularity should not continue to grow. It is the most accessible of all of our great scenic national parks, because one may reach it from St. Louis or Chicago in 30 hours.

From every standpoint this park merits the consideration of the Federal Government. and the first step in its development will have been taken when the pending bill is enacted into law. It is my hope that such action may be taken by the Congress in its present session.

Cordially, yours,

FRANKLIN K. LANE,
Secretary.

Hon. SCOTT FERRIS,
Chairman Public Lands Committee,
House of Representatives.

[Senate Report No. 502, Sixty-fifth Congress, second session.]

NATIONAL HIGHWAY CONNECTING NATIONAL MONUMENTS IN THE STATES OF UTAH, ARIZONA, AND NEW MEXICO.

JUNE 10 (calendar day, JUNE 13), 1918.—Ordered to be printed.

Mr. SHAFROTH, from the Committee on Public Lands, submitted the following report (to accompany S. 4439):

The Committee on Public Lands, to which was referred the bill (S. 4439) to provide for the survey of a national highway connecting certain national monuments in the States of Utah, Arizona, and New Mexico, having had the same under consideration, begs leave to report it back to the Senate with the recommendation that the bill do pass.

The bill was referred to the Department of the Interior, and the Secretary of the department furnished the committee with the following report thereon:

DEPARTMENT OF THE INTERIOR,
Washington, May 17, 1918.

MY DEAR SENATOR: I have received your request for a report on S. 4439, a bill to provide for the survey of a national highway connecting certain national monuments in the States of Utah, Arizona, and New Mexico.

This measure proposes that the Secretary of Agriculture shall survey and examine a feasible route for a highway connecting the Mukuntuweap National Monument, the Grand Canyon National Monument, the Mesa Verde National Park, the Rainbow Bridge National Monument, and the Natural Bridges National Monument, and that upon completion of this survey a report shall be made to Congress.

With the exception of the Grand Canyon National Monument, all of the reservations mentioned in the bill are under the jurisdiction of the Department of the Interior, and are immediately under the control of the National Park Service under the act of August 25, 1916 (39 Stat., 535). S. 390, now pending, proposes to establish the Grand Canyon National Park within the area now included in the national monument.

All of these parks and monuments lie in a part of the Southwest that is geologically and scenically one of the most interesting parts of the United States. Most of it is now inaccessible to motor-driven or horse-drawn vehicles. At least one of the monuments—the Rainbow Bridge National Monument—is very difficult to reach even with saddle horse, because trail improvement, as well as the construction of roads, has been too costly to be undertaken in this region by the small population. Indeed, it seems that this region is one that may never be developed if State or county funds must be used in road and trail improvement. There are few farms in the valleys, there are no industries, and up to the present time there has been no mineral development. Much of the territory belongs to the Indians. All of the great scenic resources are in national reservations.

It seems proper, therefore, that the Federal Government should proceed on the assumption that a national highway must ultimately be constructed to connect the various national parks and national monuments mentioned, and that, in any event, the proposed survey would materially advance the time when this highway would be constructed without regard to whether the Federal Government or the States themselves perform the actual construction work, either individually or under a program of cooperation. Furthermore, it seems that a survey of this character might well be conducted during the period of the war, in order that Congress may have a report thereon available for consideration at such time after the restoration of peace as it deems advisable to take up the question of whether or not the proposed highway shall or shall not be built by the United States. I therefore recommend that the bill receive favorable consideration.

Mukuntuweap National Monument is now known as the Zion National Monument, the name having been changed by presidential proclamation of March 18, 1918. I would also point out that Mesa Verde National Park lies in the State of Colorado, and that the Navajo National Monument in Arizona, just south of the Arizona-Utah boundary, is not mentioned in the bill. This monument, which would be made accessible by the proposed road, contains the famous Betatakin (Hillside House), Kit Siel (Broken Pottery House), and Inscription House ruins, cliff dwellings which have recently been repaired under an appropriation of $3,000 made by Congress in the act of May 18, 1916 (39 Stat., 182).

Cordially, yours,

ALEXANDER T. VOGELSANG,
Acting Secretary.

Hon. HENRY L. MYERS,
Chairman Committee on Public Lands, United States Senate.

[Senate Report No. 249, Sixty-fifth Congress, second session.]

LANDS FOR HOTEL PURPOSES, YELLOWSTONE, MONT.

FEBRUARY 7, 1918.—Ordered to be printed.

Mr. MYERS, from the Committee on Public Lands, submitted the following report to accompany S. 41:

The Committee on Public Lands, to which was referred the bill (S. 41) to authorize the sale of certain lands at or near Yellowstone, Mont., for hotel purposes, having had the same under consideration, beg leave to report it back to the Senate with amendment, and as amended recommend that the bill do pass.

The bill was referred to the Departments of the Interior and of Agriculture, and the Secretaries of those departments furnished the committee with the following reports thereon:

DEPARTMENT OF THE INTERIOR,
Washington, December 15, 1917.

Hon. HENRY L. MYERS,
United States Senate.

MY DEAR SENATOR: I am in receipt of your request for report on S. 41, entitled "A bill to authorize the sale of certain lands at or near Yellowstone, Mont., for hotel purposes."

The bill and S. 7827, Sixty-fourth Congress, second session, are identical. Under date of February 17, 1917, I reported in favor of the enactment of the latter bill, provided it were amended in certain particulars. The status of the land is unaltered and nothing has occurred since that date to cause me to change the views therein expressed, and I inclose herein copy of such report.

Cordially, yours,

FRANKLIN K. LANE,
Secretary.

DEPARTMENT OF THE INTERIOR,
Washington, February 17, 1917.

Hon. HENRY L. MYERS,
Chairman Committee on Public Lands, United States Senate.

MY DEAR SENATOR: In response to your request therefor I have the honor to submit the following report on S. 7827:

The bill proposes to authorize the sale of a tract of 126.51 acres in section 34, township 13 south, range 5 east, in the Madison National Forest, Mont., at or near the town of Yellowstone, to the Oregon Short Line Railroad Co. for hotel purposes, at a price to be fixed by appraisement, at not less than $25 per acre. The tract adjoins the Yellowstone National Park on the east and lies south of the track and station grounds of the company's station at Yellowstone, the terminus of the branch line of the road to the western entrance to the park.

The town of Yellowstone is located north of the right of way and station grounds in said section near the park and is occupied under permit from the Forest Service.

The records of the General Land Office show that the portion of township 13 south, range 5 east, not in the park, is surveyed and part of the Madison National Forest, the park boundary in the township passing through the east half of the east half of section 34 and the range of sections north of 34, and that that portion of the east half of the section not in the park is defined by the plat of survey as lots 1, 2, 3, and 4. The tract described in the bill is public and joins the right of way for track, Y, and station grounds granted the Yellowstone Park Railroad Co., now part of the Oregon Short Line, November 10, 1906, the location of such right of way in the section being shown upon the accompanying diagram upon which the area described in bill has also been indicated. It appears from correspondence received from the resident attorneys of the Oregon Short Line that the company proposes to erect a commodious and well-equipped hotel on lot 3, opposite its present station, and desires sufficient area for grounds, golf links, etc., and to admit of certain changes in its tracks.

From the information before me and in view of the demand for hotel facilities at this entrance for the accommodation of the increasing number of visitors to the park from the West, I think the company should be permitted to acquire that portion of the tract described in the bill needed in connection with its proposed hotel, and therefore recommend that the bill, if amended in the following particulars, be enacted. Certain railroad purposes are involved, such as additional terminal facilities, sidetracks, etc, and I would therefore suggest that the words "and other" be inserted after "hotel" in the title of the bill and also in line 7, page 1, thereof. Since it appears that the tract described is probably larger than is needed to effect the purposes contemplated, and also as I am informed that the company may find it advisable to move the existing Y tracks farther westward, I would suggest that that portion of the tract in the west half of the west half of the section be excluded, and that the right of way for the Y be not excepted from the NE. ¼ of the SW. ¼, and therefore, that the description given in the bill be stricken out from "The" in line 11, page 1, through "acres" in line 8, page 2, and the following description be substituted therefor:

"Lot three and the northeast quarter of the southwest quarter of section thirty-four in township thirteen south, of range five east, Montana Principal Meridian, including the area at present covered by the right of way for the wye tracks of said Oregon Short Line Railroad Company; also all that portion of the southeast quarter of the northwest quarter of said section thirty-four lying south of the right of way and station grounds of said company, the entire tract above described consisting of eighty-eight and two one-hundredths acres."

In order that this department may have the same jurisdiction over the management of a hotel on this tract as is conferred by the act of February 10, 1912 (37 Stat., 64), under which the site at Glacier Park, Mont., was acquired and the hotel thereon has been satisfactorily operated, I would suggest that the following proviso be added to the bill after "Forest," line 14, page 2:

"*Provided, however*, That any hotel erected on said lands shall be operated by the said Oregon Short Line Railroad Company, or its successors in interest, under such rules and regulations as the Secretary of the Interior may prescribe for the conduct and operation of hotels within the Yellowstone National Park."

The land is within the Madison National Forest, and I am informed that the Secretary of Agriculture has submitted a report on the bill.

Cordially, yours,

FRANKLIN K. LANE,
Secretary.

JANUARY 2, 1918.

Hon. HENRY L. MYERS,
Chairman Committee on Public Lands, United States Senate.

DEAR SENATOR MYERS: Receipt is acknowledged of a copy of the bill S. 41 "To authorize the sale of certain lands at or near Yellowstone, Mont., for hotel purposes." with the request that your committee be sent certain suggestions as this department may see fit to offer.

The bill proposes that the Secretary of the Interior be authorized to sell to the Oregon Short Line Railroad Co., for hotel purposes, 126.51 acres of land within the Madison National Forest, at a price to be fixed by appraisement at not less than $25 per acre, and under such terms, conditions, and regulations as the Secretary of the Interior may prescribe. This land adjoins the Yellowstone National Park and is is now traversed by railroad tracks of the Oregon Short Line which extend to this point. The principal object of this extension is to carry tourists and supplies to the Yellowstone National Park.

This department is in receipt of a letter from the Secretary of the Interior, in which he states that it will be in the interest of the Yellowstone National Park, which adjoins this land, to allow the railroad company to acquire title to the tracts described in the bill, and for the purpose stated therein. From information of record in the Forest Service it appears that these tracts are not needed for any special purpose in the administration of the Madison National Forest. This department recognizes that their chief value is in connection with the Yellowstone National Park, which is under the jurisdiction of the Department of the Interior. It, therefore, appears that that department's interest is dominant to any other interest of this department, although the land is now within the boundaries of a national forest.

For these reasons this department has no objection to the passage of the bill.

Very truly, yours,

D. F. HOUSTON, *Secretary.*

Amend the title so as to read "To authorize the sale of certain lands at or near Yellowstone, Montana, for hotel and other purposes."

[Senate Report No. 579, Sixty-fifth Congress, second session.]

ROADS IN NATIONAL PARKS.

OCTOBER 7, 1918.—Ordered to be printed.

Mr. SHAFROTH, from the Committee on Public Lands, submitted the following report (to accompany S. 4472):

The Committee on Public Lands, to which was referred the bill (S. 4472) providing for the sale of public lands for the purpose of using the proceeds arising therefrom in the construction of roads and other permanent improvements in national parks, having had the same under consideration, begs leave to report it back to the Senate with amendments and, as amended, recommend that the bill do pass.

The bill was referred to the Department of the Interior, and the Secretary of the department furnished the committee with the report attached hereto.

The necessity for the passage of this bill arises from the fact that several bills establishing national parks which passed the Senate without a limitation as to the amount that could be appropriated for the maintenance of the same had a limitation of $10,000 placed by the House of Representatives upon the same, which in many instances is entirely inadequate to even police the park.

For instance, the Rocky Mountain Park of Colorado is one of the most beautiful and picturesque parks in the world. The Interior Department has recommended a number of times the appropriation of larger amounts out of the General Treasury for the maintenance and improvement of the same, but invariably points of order have been made against the appropriation on account of the limitation contained in the bill creating the park. The Senate has twice passed, as to the Rocky Mountain Park, a bill repealing that limitation of $10,000 in the act creating the park, but the House does not concur in the same. They evidently do not think the General Treasury ought to be used for the purpose of either improving or maintaining the park.

This bill provides that an amount of unappropriated, unreserved, nonmineral public lands in amount equal to the total area of the national park within such State shall be selected and sold by the Secretary of the Interior in legal subdivisions of not exceeding 640 acres to each purchaser and the proceeds thereof be expended in aid of the construction, improvement, and maintenance of roads or other permanent improvements in and leading to the national park situate in such State.

While the Secretary of the Interior does not favor the sale of lands for such purposes, yet your committee believes that such policy should be determined by Congress and, therefore, recommends the passage of the bill with the following amendment:

After the word "sale," in line 12 of page 1, insert: "Shall be in legal subdivisions of not exceeding 640 acres to each purchaser and," and in line 4, after the word "provided," insert "Such sale shall not be for less than $2.50 per acre."

And, as so amended, that the bill do pass.

DEPARTMENT OF THE INTERIOR,
Washington, May 14, 1918.

Hon. HENRY L. MYERS,
Chairman Committee on Public Lands,
United States Senate.

MY DEAR SENATOR: I am in receipt of your request for report upon S. 4472, "A bill providing for the sale of public lands for the purpose of using the proceeds arising therefrom in the construction of roads and other permanent improvements in national parks."

The bill is similar in principle to Senate bill 2436 and Senate bill 3636. relating to a grant of lands to aid in the construction of roads in national forests, upon which bills I submitted adverse reports September 27, 1917, and February 26, 1918. For the information of the committee, I attach a table showing the areas in national parks by States and the unappropriated public lands in such States on July 1, 1917.

As stated in the reports mentioned dealing with the grant of public lands to aid in the construction of roads in national forests, Congress by the act of July 11, 1916, appropriated the sum of $75,000,000 for the construction of rural post roads, the several States to expend a sum equal to that contributed by the United States. Appropriation was made in the sundry civil act of June 12, 1917 (40 Stats., 151), for the administration and protection of the national parks and their improvement, and the construction of roads, trails, and bridges therein, are specifically mentioned in many instances. Should further appropriations be required for the improvement of these national parks, I believe it should be in the form of money appropriations from the Federal Treasury rather than by the devotion of areas of public lands to that purpose through the sale of the lands in a given State for the construction of roads in national parks in that State. It is quite likely that the method proposed in S. 4472 would not apportion the funds derived from the sale of the lands in the most desirable or equitable manner, as parks which might receive the largest benefits have in some instances been already more liberally provided for than other parks which would receive a smaller contribution under the bill.

The demand for public lands for homes and farms has been and continues to be very large, and I do not believe the opportunity to thus secure homes upon the public domain should be taken from the people through a reversion to the sales system of disposing of lands, even though the proceeds be devoted to road building. Under existing law the revenue from public lands, with the exception of the 10 per cent which goes to the States for educational purposes, goes into the reclamation fund for the irrigation of arid lands in the West, and a sale of lands as proposed in this measure for the benefit of roads would diminish receipts into the reclamation fund, and thus impede further reclamation work.

Following the recommendation made in the case of the bills proposing sales of public lands for the construction of roads in national forests, I recommend that S. 4472 be not enacted and that if Congress is of the opinion that further appropriations should be made for the construction of roads and other improvements in national parks it be in the form of additional money appropriations or in some other manner than through a grant of public lands.

Cordially, yours,

FRANKLIN K. LANE,
Secretary.

Area of public lands in national parks and unappropriated public lands July 1, 1917.

State.	National parks.	Unappropriated July 1, 1917.	State	National parks.	Unappropriated July 1, 1917.
	Acres.	*Acres.*		*Acres.*	*Acres.*
Arizona	480	22,309,100	Oklahoma	848	42,183
Arkansas	911	316,600	Oregon	159,360	13,850,755
California	963,316	19,505,217	South Dakota	10,522	1,010,773
Colorado	303,293	10,416,317	Washington	207,360	1,283,319
Idaho	23,040	14,316,108	Wyoming	1,992,960	26,759,500
Montana	1,108,401	11,818,414			
North Dakota	780	141,514	Total	4,771,271	121,769.750

APPENDIX E.

BIBLIOGRAPHY.

Bibliography of Books and Magazine Articles on National Park Subjects. October 1. 1917 to September 30, 1918.

BIBLIOGRAPHY OF BOOKS AND MAGAZINE ARTICLES ON NATIONAL PARK SUBJECTS, OCTOBER 1, 1917, TO SEPTEMBER 30, 1918, INCLUSIVE.

BOOKS.

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A Guide to the National Parks of America. Edited by Edward Frank Allen. Robert McBride & Co., New York, revised·edition, 1918. 338 pages. Price $1.25 net. With maps and illustrations.

Oregon the Picturesque. By Thomas D. Murphy. The Page Co., Boston, October, 1917. 314 pages. Price $3.50. Illustrated with maps and forty plates; 16 of the plates colored. Crater Lake chapter, pp. 81–109. "Into Yosemite by Motor," pp. 245–274. Petrified Forest, 277–314.

Tenting Tonight. By Mary Roberty Rinehart. Houghton Mifflin Co., Boston, 1918. 188 pages. Price $1.75 net. (Glacier National Park.) Illustrated.

The Book of Birds. By Henry W. Henshaw. National Geographic Society, Washington, D. C., 1918. 195 pags. Price $3. Illustrated in colors with 250 paintings by Louis Agassiz Fuertes.

Wild Animals of North America. By Edward W. Nelson. National Geographic Society, Washington, D. C., 1918. 231 pages. Price $3. With illustrations from paintings by Louis Agassiz Fuertes.

The Top of the Continent. By Robert Sterling Yard. Scribners. Trade edition, 1918. 244 pages. Price $1. Illustrated.

The Sand Dunes of Indiana. By E. Stillman Bailey. A. C. McClurg & Co., Chicago, December, 1917. 165 pages. Price $1.75. Illustrated.

Twenty-second Annual Report of the American Scenic and Historic Preservation Society. J. B. Lyon & Co., Albany. Printers. National Parks and Monuments, page 361.

Report of the Commissioner of Dominion Parks for the year ending March 31, 1917.

MAGAZINE ARTICLES.

Albatross, The.

- Vol. 7, No. 44 (January, 1918), p. 24. "The Grim Reaper Gets an Awfu' Beating." (A White's Wild Flight Through Yosemite Ends with Physician Transfusing Own Blood.)
- Vol. 7, No. 50 (July, 1918), p. 12. "Lake Tenaya, the Enticing." p. 28. "On the Crookedest Railroad in the World."

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- Vol. 57, No. 2 (June, 1918), p. 27. "In Yellowstone Park." (Pictorial.)
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- Vol. 5, No. 2 (December, 1917), pp. 128–131. "Mt. Jefferson Outing, 1917." By Marion Schneider.
- Vol. 5, No. 2 (December, 1917), pp. 132–135. "Mt. Jefferson." By Ira A. Williams.
- Vol. 5, No. 2 (December, 1917), pp. 136–139. "The Glaciers of Mt. Jefferson." By Laura Hatch.
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PARADISE OF THE PACIFIC.

Vol. 31, No. 2 (February, 1918), pp. 25–27. "From the Crater to the Sea." (Hawaii National Park—Kilauea.)

Vol. 31, No. 4 (April, 1918), pp. 4–7. "Why is Kilauea?" By L. W. de Vis-Norton.

Vol. 31, No. 4 (April, 1918), pp. 7–8. "Hot on the Trail of the Overflow." (Kilauea.)

Vol. 31, No. 4 (April, 1918), p. 9. "Doing her Bit Facing Fire." (Kilauea.)

Vol. 31, No. 7 (July, 1918), pp. 4–5. "Secretary of the Interior Visits Hawaii."

PARKS AND RECREATION.

Vol. 1, No. 1 (October, 1917), pp. 56–61. "Report of Committee on National Parks."

Vol. 1, No. 2 (January, 1918), pp. 63–64. "National Parks."

Vol. 1, No. 2 (January, 1918), p. 55. (Pictorial.) "View of Mount Rainier from Golf Course, Seattle."

PEACOCK FEATHERS. (Issued by Chandler Motor Co.) Vol. 1, No. 4 (June, 1918), pp. 1–2. "Sequoia Park Offers Scenic Sierran Tour."

PLEASURELAND.

Vol. 22, No. 10, (October, 1917), p. 3. "Your National Parks." By Enos A. Mills.

Vol. 22, No. 10 (October, 1917), p. 5. "An Indian Legend." By M. Imogene McPherson. (Rocky Mountain.)

Vol. 22, No. 10 (October, 1917), p. 6. "Original Estes Park." By Mrs. Sally F. Reed.

Vol. 22, No. 11 (November, 1917), p. 3. "Grand Canon of the Colorado." By Enos A. Mills.

PLEASURELAND—Continued.

Vol. 22, No. 11 (November, 1917), p. 6. "Early Visitors to Estes Park." By William Allen White.

Vol. 22, No. 12 (December, 1917), pp. 3–4. "Prehistoric Ruins in Colorado." By Eugene Parsons.

Vol. 22, No. 12 (December, 1917), p. 11. "Winter at Estes Park." By Mrs. D. J. March.

Vol. 23, No. 1 (January, 1918), pp. 5–6. "Yellowstone National Park." By Enos A. Mills.

Vol. 23, No. 1 (January, 1918), p. 13. "Loch Vale." By Charles Dana Scott. (Rocky Mountain.)

Vol. 23, No. 1 (January, 1918). p. 19. Yellowstone Animals. (Pictorial.)

Vol. 23, No. 2 (February, 1918), pp. 7–8. "The Master's Creation." By Jens Jensen. (Rocky Mountain.)

Vol. 23, No. 3 (March, 1918), p. 5. "When to Visit the Mountains." By Enos A. Mills.

Vol. 23, No. 3 (March, 1918), p. 13. "America's First Hotels." (Mesa Verde.)

Vol. 23, No. 4 (April, 1918), p. 6. "National Recreation."

Vol. 23, No. 4 (April, 1918), p. 10. "Auto Parks."

Vol. 23, No. 5 (May, 1918), p. 5. "Rocky Mountain National Park." By Willis T. Lee, Ph. D.

Vol. 23, No. 6 (June, 1918), p. 5. "A Bit of Indian Lore." By John M. Steele.

Vol. 23, No. 6 (June, 1918), p. 8. "Rocky Mountain National Park."

Vol. 23, No. 6 (June, 1918), p. 9. "Wild Basin." (Rocky Mountain.)

Vol. 23, No. 7 (July, 1918), p. 5. "Santa Fe and Spanish Trails." By Pyke Johnson.

Vol. 23, No. 7 (July, 1918), p. 7. "Sport of Kings." (Rocky Mountains.)

Vol. 23, No. 7 (July, 1918), pp. 8–9. "Our National Parks." By Charles Dana Scott.

Vol. 23, No. 8 (August, 1918), p. 5. "American Vale of Cashmere." By Samuel T. Hensel. (Rocky Mountain.)

Vol. 23, No. 8 (August, 1918), p. 6. "National Parks Association."

RECLAMATION RECORD.

Vol. 9, No. 8 (August, 1918), pp. 371–372. "National Parks and Reclamation Projects." By E. M. Peltz.

RAILROAD RED BOOK.

Vol. 35, No. 1 (January, 1918), pp. 25–32. "The National Parks and Monuments of Colorado, Utah, and New Mexico." By Horace M. Albright.

Vol. 35, No. 1 (January, 1918), pp. 72–73. "Tourists Favored the Intermountain Region in Their Recreative Program for 1917." By Harry N. Burhans.

Vol. 35, No. 1 (January, 1918), pp. 75–77. "Some Colorado Attractions and Road Statistics." By T. J. Ehrhart.

Vol. 35, No. 1 (January, 1918), pp. 245–247. "The Natural Wonders of Utah." By H. Stanley Hinrichs. (Dinosaur, Natural Bridges, Rainbow Bridge, and Zion National Monuments.)

Vol. 35, No. 2 (February, 1918), pp. 11–14. "Castles and Towers of the Hovenweep." By Dr. J. Walter Fewkes.

Vol. 35, No. 5 (May, 1918), pp. 28–33. "Delving Into How We Came to Know of the Mysterious Cliff Dwellings in Mesa Verde National Park."

Vol. 35, No. 6 (June, 1918), pp. 9–11. "Some Colorado Scenery." By Arthur B. Hardin.

Vol. 35, No. 7 (July, 1918), pp. 7-11. "Find Your Home in the San Juan Basin Country." By Charles E. Hall. (Mesa Verde.)

Vol. 35, No. 8 (August, 1918). pp. 21–23. "Visit Our National Parks."

RENAISSANCE DU TOURISME, LA.

Vol. 16, No. 15 (May, 1918), pp. 9–10. "Un Projet de Parc National dans les Abruzzes."

Vol. 16, No. 17 (July, 1918), pp. 10–11. "Les Parcs Nationaux des Etats-Unis." Par The Wanderer.

Vol. 16, No. 18 (August, 1918), pp. 5–7. "Les Parcs Nationaux des Etats-Unis." (Deuxieme article.) Par The Wanderer.

No. 9 (September, 1918), pp. 10–13. "Les Parcs Nationaux des Estats-Unis."

Review of Reviews, The American.

Vol. 57, No. 341 (June, 1918), pp. 638–642. "Our New National Parks." By Charles Frederick Carter.

Road-Maker, The.

Vol. 12, No. 1 (January, 1918). Cover design, "Giant Sequoia."

Vol. 11, No. 9 (December, 1917), p. 9. "Yosemite's 1918 Plans."

Vol. 12, No. 3 (March, 1918), pp. 7–10. "Palisades Interstate Park on the Hudson." By W A. Welch.

Vol. 12, No. 4 (April, 1918), pp. 30–31. "The Playground of the World." By W. A. Welch.

Vol. 12, No. 8 (August, 1918). Cover design, "Mount Evans."

St. Nicholas.

Vol. 45, No. 5 (March, 1918), pp. 464–465. "How Bruin Got the Beef." By Carrie B. Chandler. (Yellowstone.)

Vol. 45, No. 6 (April, 1918), pp. 483–490. "The Grand Canyon of Arizona." By William Haskell Simpson.

Saturday Evening Post.

Vol. 190, No. 22 (December 1, 1917), pp. 61–63. "Greater Yellowstone." By Emerson Hough.

Vol. 191, No. 2 (July 13, 1918). "Bad Manners Out-of-Doors." By Emerson Hough.

Vol. 191, No. 11 (September 14, 1918), pp. 109–117. "Out-of-Doors—The Sportsmen's Greatest Year." (Greater Yellowstone.)

Scientific American.

Vol. 118, No. 6 (February 9, 1918), p. 132. "Thirteen-foot Model of World's Most Active Volcano. Faithful Reproduction of Kilauea." By Professor Reginald A. Daly, of Harvard University.

Vol. 118, No. 13 (March 30, 1918). "The Jackson Hole Country of Wyoming—What the Proposed Addition to Yellowstone is Like."

Vol. 119, No. 7 (August 17, 1918), p. 129. "Motorized Railways—Mount Tamalpais." (Muir Woods.)

Vol. 119, No. 8 (August 24, 1918), p. 155. "The Mammoth and Great Onyx Caves." By Le Roy Jeffers.

Scientific American Supplement.

Vol. 85, No. 2208 (April 27, 1918), p. 268. "Lava Fluctuations at Halemaumau." By T. A. Jaggar, jr. (Kilauea-Hawaii National Park.)

Scientific Monthly, The.

Vol. 6, No. 20 (April, 1918), pp. 305–318. "A National Park Policy." By Prof. Frank A. Waugh, Massachusetts Agricultural College.

Vol. 6, No. 22 (June, 1918). "Technical Problems in the Development of National Parks." By Prof. Frank A. Waugh, Massachusetts Agricultural College.

Scribner's.

Vol. 62, No. 4 (October, 1917), pp. 399–410. "Mount McKinley National Park." By Belmore Browne.

Vol. 63, No. 6 (June, 1918), pp. 673–687. "The Motor in Yellowstone." (Frontispiece: Yellowstone Falls in color.) By Charles J. Belden.

Sierra Club Bulletin.

Vol. 10, No. 3 (January, 1918), pp. 276–281. "Record of an Early Exploration of Tenaya Canon." By J. N. Le Conte.

Vol. 10, No. 3 (January, 1918), pp. 287–291. "The Climb of Dunderberg via Virginia Canon." By George C. Thompson.

Vol. 10, No. 3 (January, 1918), pp. 291–297. "Knapsacking in the Kings-San Joaquin Region." By A. L. Jordan. (Greater Sequoia.)

Vol. 10, No. 3 (January, 1918), p. 336. Notes and Correspondence. Edited by William E. Colby.

Vol. 10, No. 3 (January, 1918), pp. 336–338. "Invasion of Our National Parks." By Mrs. John D. Sherman.

Vol. 10, No. 3 (January, 1918), pp. 338–339. "Opening of Zion Canon—Utah's Scenic Wonderland."

Vol. 10, No. 3 (January, 1918), pp. 349–350. "Economic Destiny of the National Parks." By J. Horace McFarland.

Vol. 10, No. 3 (January, 1918), pp. 351–352. "The Associated Mountaineering Clubs of North America." By LeRoy Jeffers.

Vol. 10, No. 3 (January, 1918), pp. 352–356. "The Tehipite Valley and the Kings River Canon." By Robert Sterling Yard. (Greater Sequoia.)

SIERRA CLUB BULLETIN—Continued.

Vol. 10, No. 3 (January, 1918), pp. 356–358. "A Trip to Crater Lake on Skis." By R. L. Glisan.

Vol. 10, No. 3 (January, 1918), p. 360. "The Greater Sequoia."

Vol. 10, No. 3 (January, 1918), pp. 362–372. "National Park Notes."

SUNSET.

Vol. 40, No. 3 (March, 1918), pp. 41–43. "Lodging with Montezuma." By Charles Frederick Saunders. (Montezuma Castle.)

Vol. 41, No. 2 (August, 1918), pp. 24–25. "Barking Betsy and the Chilled Volcano—A Motorcycle at Crater Lake." By Hamilton M. Laing.

Vol. 41, No. 3 (September, 1918), p. 14. "Get Outdoors." By Emerson Hough. (Yosemite.)

Vol. 41, No. 3 (September, 1918). "The Babe on Burro-Back—A Midsummer Hike in the High Sierra." By Joel H. Hildebrand. (Yosemite.)

TIMBERMAN, THE.

Vol. 19, No. 8 (June, 1918), pp. 28–29. "A Redwood National Park."

Vol. 19, No. 8 (June, 1918), p. 29. "Sequoia National Park." (Resolutions of appreciation to all who helped save the Giant Forest.)

TIDEWATER MOTORIST.

Vol. 3, No. 10 (June, 1918), pp. 6–9. "The Playground of America—Motor Trails through Western Wonderlands—The National Parks of the United States."

TRAVEL.

Vol. 29, No. 6 (October, 1917), pp. 34–37. "One Day Motor Jaunts from Washington." By C. H. Claudy. (Luray Cave.)

Vol. 29, No. 6 (October, 1917), p. 39. "Accommodations at the Mukuntuweap." (Zion Canyon.)

Vol. 30, No. 1 (November, 1917), pp. 22–24. "A Natural Park for the Metropolis." By Elon Jessup. (Bear Mountain Park.)

Vol. 30, No. 2 (December, 1917), pp. 17–21. "Enjoying Winter Sports in Colorado." By Arthur Chapman. (Rocky Mountain.)

Vol. 30, No. 4 (February, 1918), "Blackfeet Indians of Glacier National Park." Contents design.

Vol. 30, No. 4 (February, 1918), pp. 12–16. "Three Pueblos of New Mexico—Acoma, Laguna, Zuni." By Charles Francis Saunders.

Vol. 30, No. 5 (March, 1918), pp. 34–38. "Side Trips in the Indian Southwest." By Charles Francis Saunders. (Montezuma Castle, Petrified Forests, Gran Quivira.)

Vol. 30, No. 6 (April, 1918), "A Yellowstone Fawn." Contents design.

Vol. 30, No. 6 (April, 1918), pp. 9–11. "Through the Red Rock Country." By Charles Francis Saunders. (Montezuma Castle.)

Vol. 30, No. 6 (April, 1918), pp. 26–29. "Uncle Sam—Traffic Manager." By Edward Hungerford.

Vol. 31, No. 1 (May, 1918). Cover design, "Indians of Glacier National Park."

Vol. 31, No. 1 (May, 1918), pp. 5–9. "Unknown Wonders of Glacier National Park." By Guy Elliott Mitchell.

Vol. 31, No. 2 (June, 1918), pp. 34–37. "Hitting the Rainbow Trail." By William Hamilton Osborne and Phil Norton. (Casa Grande—The Apache Trail.)

Vol. 31, No. 2 (June, 1918), p. 43. "National Parks for Spain."

Vol. 31, No. 3 (July, 1918), p. 23. "Hitting the Rainbow Trail." By William Hamilton Osborne and Phil Norton. (Continued.) (The second lap in the Rainbow Trail extends from Casa Grande, "The Great House," Arizona, through California, and brings the tourist by rail and motor to beautiful Crater Lake, Oregon's hidden gem of the mountains.)

Vol. 31, No. 4 (August, 1918), p. 30. "Hitting the Rainbow Trail." By William Hamilton Osborne and Phil Norton. (Continued.)

Vol. 31, No. 5 (September, 1918), pp. 23–26. "Hitting the Rainbow Trail." By William Hamilton Osborne and Phil Norton. (Fourth paper.)

Vol. 31, No. 5 (September, 1918). "The Delayed Vacation."

Vie d'Italia, Le Anno II, No. 9 (September, 1918), pp. 552–558, "Parchi Nazionali."

WESTERN MAGAZINE, THE.

Vol. 10, No. 6 (December, 1917), pp. 176–181. "Glacier National Park in Wartime." By Willis Gibson.

WESTERN MAGAZINE, THE—Continued.
  Vol. 10, No. 6 (December, 1917). "The National Parks Highway Association." By Frank W. Guilbert. Pp. 211–214.
  Vol. 11, No. 2 (February, 1918), pp. 49–51. "On the National Parks Highway." By C. L. Llewellyn. (Mount Rainier.)

WOMAN'S WEEKLY, THE.
  Vol. 1, No. 47 (July 20, 1918), pp. 1–2. "Our National Parks in War Time." By Robert Sterling Yard.

WORLD OUTLOOK.
  Vol. 6, No. 1 (January, 1918). Contents design. "Indians of Glacier National Park."
  Vol. 6, No. 1 (January, 1918). "Is Uncle Sam a Good Indian Chief?" By Francis E. Leupp. (Illustrated by photographs from Glacier and Mesa Verde.)

APPENDIX F.

NATIONAL PARK PUBLICATIONS.

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NATIONAL PARK PUBLICATIONS.

[Mailed free of charge upon application to the Director of the National Park Service.]

Annual Report of the National Park Service for the Year 1918. By Stephen T. Mather, director.

Contains summary of the operation and development of the national parks for current year, photographs of more important improvements, reports of park superintendents, national park and monument statistics, etc.

Annual Report of the National Park Service for the year 1917. By Horace M. Albright, acting director. (Edition exhausted.)

Progress in the Development of the National Parks. By Stephen T. Mather, Director of the National Park Service. 1916. 39 pages.

Glimpses of our National Parks. By Robert Sterling Yard, chief, educational division, National Park Service. 40 pages.

Contains descriptions of the most important features of the principal national parks and the Grand Canyon of the Colorado.

General information regarding the national monuments.

Contains descriptions of all national monuments administered by the Department of the Interior, the Department of Agriculture, and the War Department.

Report on the Proposed Sand Dunes National Park, Indiana. By Stephen T. Mather, Director of the National Park Service. 1917. 113 pages.

Contains description and maps of the sand dunes, the history of the project, and the hearings held in Chicago October 30, 1916.

Information circular containing data regarding hotels, camps, points of interest, books, magazine articles, maps, regulations, etc., about each of the following national parks:

Yellowstone.
Yosemite.
Mount Rainier.
Crater Lake.
Mesa Verde.
Sequoia and
General Grant.
Hot Springs.
Glacier.
Rocky Mountain.
Wind Cave.
Casa Grande Ruin.

Map showing all national parks and national monuments with railroad connections.

Automobile road and trail map of each of the following national parks:

Yellowstone.
Yosemite.
Mount Rainier.
Sequoia and
General Grant.
Crater Lake.
Glacier.
Rocky Mountain.

The following named publications relating to Sieur de Monts National Monument:

Announcement by the Government of the creation of the Sieur de Monts National Monument by Presidential Proclamation on July 8, 1916.

Addresses at meeting held at Bar Harbor on August 22, 1916, to commemorate the establishment of the Sieur de Monts National Monument.

The Sieur de Monts National Monument as a Bird Sanctuary.

The Coastal Setting, Rocks and Woods of the Sieur de Monts National Monument.

An Acadian Plant Sanctuary.

Wild Life and Nature Conservation in the Eastern States.

Man and Nature. Our Duty to the Future.

The Acadian Forest.

The Sieur de Monts National Monument as commemorating Acadia and early French influences of Race and Settlement in the United States.

Purchas translation of de Monts' Commission. De Monts: an Appreciation.

Natural Bird Gardens on Mount Desert Island.

The Sieur de Monts National Monument and its Historical Associations.

Garden Approaches to the National Monument. The White Mountain National Forest. Crawford Notch in 1797.

Two National Monuments—The Desert and the Ocean Front. (Mount Desert, Maine; and Zion Canyon, Utah.)

SOLD BY THE SUPERINTENDENT OF DOCUMENTS.

(Remittances for publications listed below should be by money order, payable to the Superintendent of Documents, Government Printing Office, Washington, D. C., or in cash. Checks and postage stamps can not be accepted.)

PAMPHLETS.

Geological History of Yellowstone National Park. By Arnold Hague. 1912. 24 pages, including 10 illustrations. 10 cents.

Contains a general résumé of the geologic forces that have been active in the Yellowstone National Park.

Geysers. By Walter Harvey Weed. 1912. 32 pages, including 23 illustrations. 10 cents.

In this pamphlet is a description of the forces which have produced the geysers.

Fossil Forests of Yellowstone National Park. By F. H. Knowlton. 1914. 32 pages, including 15 illustrations. 10 cents.

Contains descriptions of the fossil forests of the Yellowstone National Park and an account of their origin

Fishes of the Yellowstone National Park. By W. C. Kendall. (Bureau of Fisheries Document 818.) 1915. 28 pages, including 17 illustrations. 5 cents.

Contains descriptions of the species and lists of streams where found.

Origin of the Scenic Features of Glacier National Park. By M. R. Campbell. 1914. 42 pages, including 25 illustrations. 15 cents.

Contains a general account of the forces that have caused the development of the mountain ranges, the valleys, and lakes of Glacier National Park.

Glaciers of Glacier National Park. By W. C. Alden. 1914. 48 pages, including 30 illustrations. 15 cents.

Contains descriptions of the principal features of the larger glaciers in the park.

Some Lakes of Glacier National Park. By M. J. Elrod. 1912. 32 pages, including 19 illustrations. 10 cents.

Contains a description of some of the principal lakes, with special reference to the possibility of stocking the lakes with fish.

Glacier National Park—A Popular Guide to Its Geology and Scenery. By M. R. Campbell. (Bulletin 600, U. S. Geological Survey.) 1914. 54 pages, 13 plates, including map. 30 cents.

Geological History of Crater Lake. By J. S. Diller. 1912. 32 pages, including 28 illustrations. 10 cents.

Contains an account of the formation of Crater Lake.

Forests of Crater Lake National Park. By J. F. Pernot. 1916. 40 pages, including 26 illustrations. 20 cents.

Contains descriptions of the forest cover and of the principal species.

Features of the Flora of Mount Rainier National Park. By J. B. Flett. 1916. 48 pages, including 40 illustrations. 25 cents.

Contains descriptions of the flowering trees, shrubs, and plants in the park.

Forests of Mount Rainier National Park. By G. F. Allen. 1916. 32 pages, including 27 illustrations. 20 cents.

Contains descriptions of the forest cover and of the principal species.

Mount Rainier and Its Glaciers. By F. E. Matthes. 1914. 48 pages, including 26 illustrations. 15 cents.

Contains a general account of the glaciers of Mount Rainier, and of the development of the valleys and basins surrounding the peak.

Sketch of Yosemite National Park and An Account of the Origin of Yosemite and Hetch Hetchy Valleys. By F. E. Matthes. 1912. 48 pages, including 24 illustrations. 10 cents.

Contains a description of the general features of the Sierra Nevada and the Yosemite National Park and an account of the origin of the Yosemite and Hetch Hetchy Valleys

Forests of Yosemite, Sequoia, and General Grant National Parks. By C. L. Hill. 1916. 40 pages, including 23 illustrations. 20 cents.

Contains description of the forest cover and of the principal species.

The Secret of the Big Trees—Yosemite, Sequoia, and General Grant National Parks. By Ellsworth Huntington. 1913. 24 pages, including 14 illustrations. 5 cents.

Contains an account of the climatic changes that are indicated by the thickness of the growth rings in the big trees, and gives a comparative statement of the climatic conditions in California and Asia during a period of 3,400 years.

Antiquities of the Mesa Verde National Park: Spruce Tree House.[1] By J. W. Fewkes. (Bull. 41, Bureau of American Ethnology.) 1909. 58 pages, 21 plates, 37 text figures. 40 cents.

Contains a detailed account of the structure and of the objects found in it.

Antiquities of Mesa Verde National Park: Cliff Palace.[1] By J. W. Fewkes. (Bull. 51, Bureau of American Ethnology.) 1911. 82 pages, 35 plates, 4 text figures. 45 cents.

Contains a detailed account of the structure and of the objects found in it.

Excavation and Repair of Sun Temple. By J. W. Fewkes. 1916. 32 pages, including 18 illustrations. 15 cents.

Contains an account of a new ruin discovered in 1915.

Analyses of the Waters of the Hot Springs of Arkansas, by J. K. Haywood, and Geological Sketch of Hot Springs, Ark., by Walter Harvey Webb. 56 pages. 10 cents.

Proceedings of the [First] National Park Conference Held at Yellowstone National Park, September 11 and 12, 1911. 210 pages. 15 cents.

Contains a discussion of national-park problems by officers of the Government and other persons.

Proceedings of the [Second] National Park Conference Held at Yosemite National Park, October 14, 15, and 16, 1912. 146 pages. 15 cents.

Consists mainly of a discussion regarding the advisability of admitting automobiles to the national parks.

Proceedings of the [Third] National Park Conference Held at Berkeley, Cal., March 11, 12, and 13, 1915. 1915. 166 pages. 20 cents.

Contains discussions of national-park problems by officers of the Government and others.

Proceedings of the [Fourth] National Park Conference Held at Washington, D. C., January 2 to 6, 1917. 362 pages. 25 cents.

Contains discussions of national-park problems by officers of the Government and others.

The National Parks Portfolio. By Robert Sterling Yard, chief, educational division, National Park Service.

Contains nine sections, each descriptive of a national park and one description of the Grand Canyon. 1917. 260 pages, including 270 illustrations. Pamphlet edition, loose in flexible cover, 35 cents; book edition, containing same material securely bound in cloth, 55 cents.

Geologic Story of Rocky Mountain National Park. By Willis T. Lee, Ph. D. 1917. 89 pages, 45 plates, 6 text figures. 30 cents.

Contains a detailed description of the park and its various geologic and scenic features.

Wild Animals of Glacier National Park. By Vernon Bailey. (Including Birds of Glacier National Park. By Florence Merriam Bailey.) Now in course of publication. Price not determined.

The Volcanic History of Lassen Peak. By J. S. Diller. Price not determined.

Contains a detailed account of the geologic and scenic features of Lassen Volcanic National Park.

PANORAMIC VIEWS.

(The panoramic views listed below are based on accurate surveys and give an excellent idea of the configuration of the surface as it would appear to a person flying over it. The meadows and valleys are printed in light green, the streams and lakes in light blue, the cliffs and ridges in combinations of color, and the roads in light brown. The lettering its printed in light brown and is easily read on close inspection, but merges into the other colors when the sheet is held at some distance.)

Panoramic view of Crater National Park. 16½ x 18 inches, scale 1 mile to the inch. 25 cents.

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[1] Out of print, but new edition soon to be issued.

Panoramic view of Yosemite National Park. 18½ x 18 inches, scale 3 miles to the inch. 25 cents.

Panoramic view of Glacier National Park. 18½ x 21 inches, scale 3 miles to the inch. 25 cents.

Panoramic view of Mount Rainier National Park. 20 x 19 inches, scale 1 mile to the inch. 25 cents.

Panoramic view of Yellowstone National Park. 18 x 21 inches, scale 8 miles to the inch. 25 cents.

Panoramic view of Mesa Verde National Park., 22½ x 19 inches, scale three-fourths mile to the inch. 25 cents.

Panoramic view of Rocky Mountain National Park. 14 x 17½ inches, scale 2 miles to the inch. 25 cents.

MAPS SOLD BY THE U. S. GEOLOGICAL SURVEY.

(The maps listed below may be purchased from the Director of the United States Geological Survey, Washington, D. C. Remittances should be by money order or in cash. Personal checks can not be accepted. A discount of 40 per cent is allowed on all orders for maps amounting to $3 net or more.)

Crater Lake National Park, Oreg. Limiting parallels, 42° 48′ and 43° 04′. Limiting meridians, 122° and 122° 16′. Size, 19 by 22 inches. Scale, 1: 62,500, or about 1 mile to 1 inch. Contour interval, 50 feet. An illustrated description of the lake and the manner of its formation is given on the back of the sheet. Price, 10 cents.

Glacier National Park, Mont. Limiting parallels. 48° 14′ 36″ and 49°. Limiting meridians, 113° 10′ and 114° 30′. Size, 31 by 35 inches. Scale, 1: 125,000, or about 2 miles to 1 inch. Contour interval, 100 feet. Price, 25 cents.

Mesa Verde National Park, Colo. Limiting parallels, 37° 09′ 18″ and 37° 21′. Limiting meridians, 108° 15′ and 108° 37′ 30″. Size, 31 by 46 inches. Scale, 1: 31,250, or about one-half mile to 1 inch. Contour interval, 25 feet. Price, 20 cents.

Mount Rainier National Park, Wash. Limiting parallels, 46° 43′ 43″ and 47° 00′. Limiting meridians, 121° 30′ and 121° 55′. Size, 22 by 23 inches. Scale, 1: 62,500, or about 1 mile to 1 inch. Contour interval, 100 feet. Price, 10 cents.

Yellowstone National Park. Wyo.-Mont.-Idaho. Limiting parallels, 44° 08′ 17″ and 45° 01′ 55″. Limiting meridians, 110° and 111° 05′ 53″. Size, 32 by 36 inches. Scale, 1: 125,000, or about 2 miles to 1 inch. Contour interval, 100 feet. Price, 25 cents.

Yosemite National Park, Cal. The park limits established by acts of Congress are shown in colors. Limiting parallels, 37° 30′ and 38° 15′ 39″. Limiting meridians, 119° and 120°. Size, 29 by 31 inches. Scale, 1: 125,000, or about 2 miles to 1 inch. Contour interval, 100 feet. Price. 25 cents. Also issued folded between covers; price, 40 cents. The Yosemite Valley is shown on a larger scale on the Yosemite Valley map.

Yosemite Valley, Cal. Shown on the Yosemite Valley map. Limiting parallels, 37° 42′ and 37° 47′ 05″. Limiting meridians, 119° 30′ and 119° 43′ 40″. Scale, 1: 24,000, or about 2⅔ inches to 1 mile. Contour interval, 50 feet. Price. 10 cents.

Rocky Mountain National Park, Colo. Limiting parallels, 40° 00′ and approximately 40° 33′ 15″. Limiting meridians, 105° 30′ and 106° 00′. Size, 17×22 inches. Scale, 1: 125,000, or about 2 miles to 1 inch. Contour interval, 100 feet. (In course of publication.)

(Some of the national parks and reservations are shown in whole or in part on the standard topographic maps, as indicated below.)

Casa Grande Ruin, Ariz. The northern part of this area is shown on the Sacaton map. Scale, 1: 62,500, or about 1 mile to 1 inch. Contour interval, 50 feet. Price, 10 cents.

General Grant National Park, Cal. Shown on the Tehipite map. Scale, 1: 125,000, or about 2 miles to 1 inch. Contour interval, 100 feet. Price, 10 cents.

Hot Springs Reservation, Ark. Shown on the map of Hot Springs and vicinity. Scale, 1: 62,500, or about 1 mile to 1 inch. Contour interval, 20 feet. Price, 10 cents.

Platt National Park, Okla. This park is at the town of Sulphur, Murray County, which is shown on the Stonewall map. Scale, 1: 125,000, or about 2 miles to 1 inch. Contour interval. 50 feet. Price, 10 cents.

Sequoia National Park, Cal. Shown on the Kaweah and Tehipite maps. Scale, 1:125,000, or about 2 miles to 1 inch. Contour interval, 100 feet. Price of each map, 10 cents.

Wind Cave National Park, S. Dak. Shown on the Harney Peak and Hermosa maps. Scale, 1:125,000, or about 2 miles to 1 inch. Contour interval, 100 feet. Price of each map, 10 cents.

RAILROAD GUIDEBOOKS.

(In the Geological Survey bulletins listed below are described the geography, geology, history, and natural resources of the regions traversed by the principal transcontinental routes. Every effort has been made to make the volumes interesting as well as accurate. Matter slightly more detailed or technical than that in the body of the text has been separated as footnotes, and a glossary has been provided for such geologic terms as it was necessary to use. The more important sources of geologic information on the region are listed in the back, and a table showing the principal divisions of geologic time appears on the backs of the title pages.)

Guidebook of the Western United States, Part A, the Northern Pacific Route, with a side trip to Yellowstone Park, by M. R. Campbell and others. (Bulletin 611, U. S. Geological Survey.) 1915. 212 pages, 27 route maps, 27 plates, 39 text figures. 50 cents.

This volume deals with the country along the Northern Pacific Railway from St. Paul to Seattle and along the branch line to Yellowstone Park. It is the purpose of this volume to answer some of the questions which these views from the car windows evoke, to tell what the rocks are and how they got there, to explain the effects of earth movements upon them, to show how that conspicuous element in scenery which we call topography is the result of a long succession of geologic events—in brief, to tell the story of the mountains, valleys, and plains. It does not stop there, however. It connects this record of the prehistoric past with the present march of western progress and development by showing the relation of geologic processes to natural resources of various kinds; it describes the utilization of these resources and tells how man has turned them to account.

Guidebook of the Western United States, Part B, the Overland Route, with a side trip to Yellowstone Park, by W. T. Lee, R. W. Stone, H. S. Gale, and others. (Bulletin 612, U. S. Geological Survey.) 1915. 244 pages, 29 route maps, 50 plates, 20 text figures. 50 cents.

A handbook for the traveler which deals not only with the geology but with the natural resources, history, and development of the country along the Union Pacific System between Omaha and San Francisco. It shows how differences in scenery and climate depend upon past geologic events and dispels the monotony of the great plains by taking the traveler back to times when these regions supported a vegetation very different from their present scanty covering and were inhabited by animals of strange forms and large size. The scenery of the mountains acquires additional interest from the explanation of the earth movements and the resulting rock structures to which fundamentally the mountain forms are due.

Guidebook of the Western United States, Part C, the Sante Fe Route, with a side trip to the Grand Canyon of the Colorado, by N. H. Darton and others. (Bulletin 613, U. S. Geological Survey.) 1915. 194 pages, 25 route maps, 42 plates, 40 text figures. 50 cents.

This guide describes the country along the Atchison, Topeka & Santa Fe Railway from Kansas City to Los Angeles. Although the description of the rocks and their relations and the scenic features form a large proportion of the matter, nearly every page gives information as to notable historic events, industrial resources, plants, and animals. The story of the Indians, past and present, especially the characteristic Pueblo tribes, is told in some detail. Many of the facts regarding the rocks are here presented for the first time. The book contains numerous views of prominent scenic features and pictures of restoration of some of the very remarkable animals whose bones are found in the clays.

Guidebook of the Western United States, Part D, the Shasta Route and Coast Line, by J. S. Diller and others. (Bulletin 614, U. S. Geological Survey.) 1915. 142 pages, 19 route maps, 33 plates, 15 text figures. 50 cents.

A manual for the traveler between Seattle or Los Angeles and San Francisco, which describes in clear, simple language the geography, geology, history, and natural resources of the region visible from the car windows. Geology is made interesting to the reader by an avoidance of details and by the selection for treatment of the features that are likely to attract the eye. Care is taken also to point out the connection between the story of the earth and the present human activity in the region. The book is divided into two parts, one dealing with the route from Seattle to San Francisco and one with the route from Los Angeles to San Francisco.

APPENDIX G.

MISCELLANEOUS.

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Statement of National Park Policy.

DEPARTMENT OF THE INTERIOR,
Washington, May 13, 1918.

DEAR MR. MATHER: The National Park Service has been established as a bureau of this department just one year. During this period our efforts have been chiefly directed toward the building of an effective organization while engaged in the performance of duties relating to the administration, protection, and improvement of the national parks and monuments, as required by law. This constructive work is now completed. The new Service is fully organized; its personnel has been carefully chosen; it has been conveniently and comfortably situated in the new Interior Department Building; and it has been splendidly equipped for the quick and effective transaction of its business.

For the information of the public an outline of the administrative policy to which the new Service will adhere may now be announced. This policy is based on three broad principals: " First, that the national parks must be maintained in absolutely unimpaired form for the use of future generations as well as those of our own time; second, that they are set apart for the use, observation, health, and pleasure of the people; and third, that the national interest must dictate all decisions affecting public or private enterprise in the parks."

Every activity of the Service is subordinate to the duties imposed upon it to faithfully preserve the parks for posterity in essentially their natural state. The commercial use of these reservations, except as specially authorized by law, or such as may be incidental to the accommodation and entertainment of visitors, will not be permitted under any circumstances.

In all of the national parks except Yellowstone you may permit the grazing of cattle in isolated regions not frequented by visitors, and where no injury to the natural features of the parks may result from such use. The grazing of sheep, however, must not be permitted in any national park.

In leasing lands for the operation of hotels, camps, transportation facilities, or other public service under strict Government control, concessioners should be confined to tracts no larger than absolutely necessary for the purposes of their business enterprises.

You should not permit the leasing of park lands for summer homes. It is conceivable, and even exceedingly probable, that within a few years under a policy of permitting the establishment of summer homes in national parks, these reservations might become so generally settled as to exclude the public from convenient access to their streams, lakes, and other natural features, and thus destroy the very basis upon which this national playground system is being constructed.

You should not permit the cutting of trees except where timber is needed in the construction of buildings or other improvements within the park and can be removed without injury to the forests or disfigurement of the landscape, where the thinning of forests or cutting of vistas will improve the scenic features of the parks, or where their destruction is necessary to eliminate insect infestations or diseases common to forests and shrubs.

In the construction of roads, trails, buildings, and other improvements, particular attention must be devoted always to the harmonizing of these improvements with the landscape. This is a most important item in our program of development and requires the employment of trained engineers who either possess a knowledge of landscape architecture or have a proper appreciation of the esthetic value of park lands. All improvements will be carried out in accordance with a preconceived plan developed with special reference to the preservation of the landscape, and comprehensive plans for future development of the national parks on an adequate scale will be prepared as funds are available for this purpose.

Wherever the Federal Government has exclusive jurisdiction over national parks it is clear that more effective measures for the protection of the parks can be taken. The Federal Government has exclusive jurisdiction over the national parks in the States of Arkansas, Oklahoma, Wyoming, Montana, Washington, and Oregon, and also in the Territories of Hawaii and Alaska. We should urge the cession of exclusive jurisdiction over the parks in the other States, and particularly in California and Colorado.

There are many private holdings in the national parks, and many of these seriously hamper the administration of these reservations. All of them should be eliminated as far as it is practicable to accomplish this purpose in the course of time, either through congressional appropriation or by acceptance of donations of these lands. Isolated tracts in important scenic areas should be given first consideration, of course, in the purchase of private property.

Every opportunity should be afforded the public, wherever possible, to enjoy the national parks in the manner that best satisfies the individual taste. Automobiles and motorcycles will be permitted in all of the national parks; in fact, the parks will be kept accessible by any means practicable.

All outdoor sports which may be maintained consistently with the observation of the safeguards thrown around the national parks by law will be heartily indorsed and aided wherever possible. Mountain climbing, horseback riding, walking, motoring, swimming, boating, and fishing will ever be the favorite sports. Winter sports will be developed in the parks that are accessible throughout the year. Hunting will not be permitted in any national park.

The educational, as well as the recreational, use of the national parks should be encouraged in every practicable way. University and high-schoool classes in science will find special facilities for their vacation-period studies. Museums containing specimens of wild flowers, shrubs, and trees, and mounted animals, birds, and fish native to the parks, and other exhibits of this character will be established as authorized.

Low-priced camps operated by concessioners should be maintained, as well as comfortable and even luxurious hotels wherever the volume of travel warrants the establishment of these classes of accommodations. In each reservation, as funds are available, a system of free camp sites will be cleared, and these grounds will be equipped with adequate water and sanitation facilities.

As concessions in the national parks represent in most instances a large investment, and as the obligation to render service satisfactory to the department at carefully regulated rates is imposed, these enterprises must be given a large measure of protection, and, generally speaking, competitive business should not be authorized where a concession is meeting our requirements, which, of course, will as nearly as possible coincide with the needs of the traveling public.

All concessions should yield revenue to the Federal Government, but the development of the revenues of the parks should not impose a burden upon the visitor.

Automobile fees in the parks should be reduced as the volume of motor travel increases.

For assistance in the solution of administrative problems in the parks relating both to their protection and use the scientific bureaus of the Government offer facilities of the highest worth and authority. In the protection of the public health, for instance, the destruction of insect pests in the forests, the care of wild animals, and the propagation and distribution of fish, you should utilize their hearty cooperation to the utmost.

You should utilize to the fullest extent the opportunity afforded by the Railroad Administration in appointing a committee of western railroads to inform the traveling public how to comfortably reach the national parks; you should diligently extend and use the splendid cooperation developed during the last three years among chambers of commerce, tourist bureaus, and automobile highway associations for the purpose of spreading information about our national parks and facilitating their use and enjoyment; you should keep informed of park movements and park progress, municipal, county, and State, both at home and abroad, for the purpose of adapting, whenever practicable, the world's best thought to the needs of the national parks. You should encourage all movements looking to outdoor living. In particular, you should maintain close working relationship with the Dominion parks branch of the Canadian department of the interior and assist in the solution of park problems of an international character.

The department is often requested for reports on pending legislation proposing the establishment of new national parks or the addition of lands to existing parks. Complete data on such park projects should be obtained by the National Park Service and submitted to the department in tentative form of report to Congress.

In studying new park projects you should seek to find "scenery of supreme and distinctive quality or some natural feature so extraordinary or unique as to be of national interest and importance." You should seek "distinguished examples of typical forms of world architecture," such, for instance, as the Grand Canyon, as exemplifying the highest accomplishment of stream erosion, and the high. rugged portion of Mount Desert Island as exemplifying the oldest rock forms in America and the luxuriance of deciduous forests.

The national park system as now constituted should not be lowered in standard, dignity, and prestige by the inclusion of areas which express in less than the highest terms the particular class or kind of exhibit which they represent.

It is not necessary that a national park should have a large area. The element of size is of no importance as long as the park is susceptible of effective administration and control.

You should study existing national parks with the idea of improving them by the addition of adjacent areas which will complete their scenic purposes or facilitate administration. The addition of the Teton Mountains to the Yellowstone National Park, for instance, will supply Yellowstone's greatest need, which is an uplift of glacier-bearing peaks; and the addition to the Sequoia National Park of the Sierra summits and slopes to the north and east, as contemplated by pending legislation, will create a reservation unique in the world, because of its combination of gigantic trees, extraordinary canyons, and mountain masses.

In considering projects involving the establishment of new national parks or the extension of existing park areas by delimination of national forests, you should observe what effect such delimination would have on the administration of adjacent forest lands, and, wherever practicable, you should engage in an investigation of such park projects jointly with officers of the Forest Service, in order that questions of national park and national forest policy as they affect the lands involved may be thoroughly understood.

Cordially, yours,

FRANKLIN K. LANE,
Secretary.

MR. STEPHEN T. MATHER,
Director, National Park Service.

ASSOCIATED MOUNTAINEERING CLUBS OF NORTH AMERICA [1]

American Alpine Club.

President, Charles E. Fay, Tufts College, Massachusetts.

Vice presidents, L. L. Delafield, 20 Exchange Place, New York; W. E. Colby, 402 Mills Building, San Francisco, Cal.

Secretary, R. H. Chapman, 2029 Q Street, Washington, D. C.

Treasurer, B. F. Seaver, 14 Wall Street, New York.

Librarian, Le Roy Jeffers, 476 Fifth Avenue, New York.

Membership.—Active, 70; life, 11; honorary, 12; total, 93.

Annual dues, $5; life, $50.

Annual meeting held in Boston, New York, or Philadelphia early in January.

Publication, Alpina Americana, supplied by Williams & Wilkins Co., 2419 Greenmount Avenue, Baltimore, Md., at $0.85 a copy. No. 1, J. N. Le Conte, High Sierra of California, 1907. No. 2, C. E. Fay, Canadian Rocky Mountains, 1911. No. 3, A. H. Brooks, Mountain Exploration in Alaska, 1914.

The club's collection of mountaineering books and photographs is deposited with that of the New York Public Library, 476 Fifth Avenue in room 225.

American Game Protective Association, 2271 Woolworth Building, New York.

President, John B. Burnham, 233 Broadway, New York.

Vice presidents, W. S. Haskell, 233 Broadway, New York, E. A. Quarles, 233 Broadway, New York.

Secretary-treasurer, G. M. Fayles, 233 Broadway, New York.

Dues—Member, $1 plus subscription to any one of several leading sportsmen's magazines which carry monthly a department of wild-life conservation propaganda furnished by the association; club member (for organizations), $5; associate member, $25; sustaining member, $100; life member, $250; patron, $1,000; founder, $5,000; benefactor, $25,000.

Annual meeting, first Monday and Tuesday in March.

Publication, bulletin (quarterly), edited by E. A. Quarles. Sent without charge to all members.

The National Park Service, through its officers, is also represented in this association.

American Museum of Natural History, Seventy-seventh Street and Central Park West, New York.

President, H. F. Osborn, Seventy-seventh Street and Central Park West, New York.

Vice presidents, C. H. Dodge, J. P. Morgan.

Director, F. A. Lucas, Seventy-seventh Street and Central Park West, New York.

Secretary, Adrian Iselin, Seventy-seventh Street and Central Park West, New York.

Treasurer, H. P. Davison, Seventy-seventh Street and Central Park West, New York.

Librarian, R. W. Tower, Seventy-seventh Street and Central Park West, New York.

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[1] Data assembled by Le Roy Jeffers, secretary, 476 Fifth Avenue, New York City.

Membership.—Annual, 3,054; associate, 179; sustaining, 84; life, 682; fellow, 40; patron, 107; associate benefactor, 18; associate founder, 10; benefactor, 4; honorary fellow, 8; total, 4,186.

Dues.—Annual, $10; associate (nonresident), $3; sustaining, $25; life, $100; fellow, $500; patron, $1.000; associate benefactor, $10,000; associate founder, $25,000; benefactor, $50,000.

Annual meeting, first Monday in February.

Publication, American Museum Journal (October to May), edited by Miss M. C. Dickerson, $1.50 a year. Scientific publications comprising memoirs, bulletin, anthropological papers, monographs. Popular publications comprising handbooks, leaflets, general guide.

The library of the American Museum consists of about 70,000 volumes on natural history, ethnology, and travel, which are located on the fifth floor of the museum building at Seventy-seventh Street and Central Park West.

Adirondack Camp and Trail Club, Lake Placid Club, New York.

President, Godfrey Dewey (acting president), Lake Placid Club, New York.

Vice president, E. A. Woods, Frick Building, Pittsburgh, Pa.

Secretary, Godfrey Dewey, Lake Placid Club, New York.

Treasurer, F. B. Guild, Lake Placid, N. Y.

Membership.—Active, 20; associate, 9; life, 1; honorary, 1; total, 31.

Annual dues.—Active, $10; associate, $5; life, $100.

Annual meeting, middle of August.

The club keeps open about 50 miles of trails in the Adirondacks and has built seven camps, which are open to the public.

Alpine Club of Canada,[1] *Banff, Alberta, Canada.*

President, J. D. Patterson, Woodstock, Ontario.

Vice Presidents, Col. C. H. Mitchell, Toronto, Ontario; Col. W. W. Foster, Victoria, British Columbia.

Director, A. O. Wheeler, Sidney, British Columbia.

Secretary-treasurer, S. H. Mitchell, Sidney, British Columbia.

SECTIONS.

Toronto.—Chairman, R. A. Gray; secretary, Prof. C. B. Sissons, Victoria College.

Winnipeg.—Chairman, I. F. Brooks; secretary, Miss D. E. Mitchell, 702 Dorchester Avenue.

Calgary.—Chairman, T. B. Moffat; secretary, L. C. Wilson, box 587.

Edmonton.—Chairman, A. S. Matheson; secretary, Miss K. Sharpe, 7 Rene Le Marchand.

Vancouver.—Chairman, Rev. A. H. Sovereign; secretary, Miss E. C. Smith, 1746 Macdonald Street.

Vancouver Island.—Chairman, R. D. McCaw; secretary, Miss J. L. McCulloch, 912 Linden Avenue, Victoria.

New York.—Chairman, A. H. MacCarthy; secretary, Mrs. E. B. Smith, 219 East Seventeenth Street, Flatbush, Brooklyn.

London, England.—Chairman, J. Norman Collie; secretary, A. L. Mumm, 4 Hyde Park Street, West.

Membership.—Active, 495; life, 42; graduating, 101; associate, 8; subscribing, 34; honorary, 11; total, 686.

Entrance fee and dues.—Active, $7.50; graduating, $5.

Annual dues.—Active, $5; graduating, $2.50; associate, $25; subscribing, $2.

Annual meeting held in July at camp.

Annual publications, The Canadian Alpine Journal, edited by A. O. Wheeler and S. H. Mitchell, $1.50 a copy; constitution and list of members.

Club house, Banff, Alberta, Canada. Open June 15 to September 30. Rate, $2.50 a day.

1918 camp, July 16 to 31, in Paradise Valley, 12 miles from Laggan. Subsidiary camp in Consolation Valley.

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[1] Not a member of the association.

Appalachian Mountain Club, 1050 Tremont Building, Boston, Mass.

President, F. S. Mason, 106 Corey Street, West Roxbury, Mass.

Vice presidents, C. G. Bullard, 88 Front Street, New York; W. E. Huntington, 647 Commonwealth Avenue, Newton Center, Mass.

Recording secretary, Harrie H. Whitney, 1050 Tremont Building, Boston.

Corresponding secretary, Ralph Lawson, 88 Washington Square, Salem, Mass.

Treasurer, W. O. Witherell, 1050 Tremont Building, Boston.

Librarian, Miss A. G. Higgins, 1050 Tremont Building, Boston.

SECTIONS.

New York.—Chairman, C. E. Buckingham, 120 Broadway, New York; secretary, H. S. Stillings, 61 Broadway, New York.

Conducts Saturday walks and holiday excursions.

Snowshoe.—Chairman, Harrie H. Whitney, 1050 Tremont Building, Boston; secretary, G. F. Haskell, City Hall Annex, Boston.

Conducts winter excursions in New Hampshire.

Membership.—Annual, 1,650; life, 278; corresponding, 50; honorary, 23; total, 2001.

Entrance fee and dues, $8.

Annual dues, $4; life, $50.

Annual meeting, second Wednesday in January.

Publications, Appalachia (annually and occasionally semiannually), edited by C. E. Fay, $0.50 a copy; Bulletin (10 issues a year); Register (annually); Reservations of the Appalachian Mountain Club, by H. W. Shepard, 1913; Snowshoe Manual, 1915, 10 cents; Equipment for Mountain Climbing and Camping, by A. H. Bent, Ralph Lawson, and Perceval Sayward, 1916, 10 cents; Guide to Paths in the White Mountains and Adjacent Regions, 1917, $2.

The club's collection of books, photographs, and maps is located at the club rooms, 1050 Tremont Building, Boston.

Clubhouse and camp on Three Mile Island, Lake Winnepesaukee, N. H., is open from June 29 to September 4. Rhododendron cottage at Fitzwilliam, N. H., is open by arrangement. Madison Spring Huts, Carter Notch Hut, and Lakes of the Clouds Hut in the White Mountains are open from July 1 to October 1.

The club conducts frequent excursions of from two or three days to two weeks to the mountains of New Hampshire, Massachusetts, Maine, and New York. Regular Saturday walks are scheduled in the vicinity of Boston and New York, and Tuesday evening summer walks near Boston.

1918 field meeting, June 29 to July 4, at Templeton Inn, Templeton, Mass.

British Columbia Mountaineering Club, Vancouver, British Columbia, Canada.

President, Charles Chapman, 3636 Fourteenth Avenue West, Vancouver, British Columbia.

Vice presidents, C. J. Heaney, 2329 Trafalgar Street, Vancouver; Miss E. B. Fowler, 1121 Melville Street, Vancouver.

Secretary, Mrs. H. E. Coulter, post-office box 1223, Vancouver, British Columbia.

Treasurer, L. C. Ford, post-office box 1223, Vancouver, British Columbia.

Membership.—Active, 96; honorary, 2; total, 98.

Entrance fee and dues, $5 ($2 during the war).

Annual dues, $2.

Annual meeting, third Monday in March.

Club cabin, on western slope of Grouse Mountain, reached via North Vancouver ferry.

The club conducts week end and holiday climbing trips. 1918 outing, August 10 to 24, at Mamquam Lake, Garibaldi district.

Colorado Mountain Club, Denver, Colo.

President, H. F. Brooks, 1732 Welton Street, Denver.

Vice president, G. C. Barnard, 1761 Wazee Street, Denver.

Secretary, G. H. Harvey, jr., 3120 West Twenty-third Avenue, Denver.

Treasurer, R. B. Rockwell, 301 Railway Exchange Building, Denver.

Membership.—Regular, 165; qualified, 270; honorary, 2; total, 437.

Annual dues, $3.

Annual meeting, third Friday in January.

Publication, Trail and Timberland (monthly), edited by Miss Annette Badgley.

The club conducts Saturday and Sunday walks and holiday excursions. Annual winter sports outing in February at Fern Lodge, Rocky Mountain National Park.

1918 outing, August 12 to 24, in the Arickaree Mountains, front range of the Rockies.

Field and Forest Club, Boston, Mass.

President, F. M. Brooks, 151 Franklin Street, Boston, Mass.

Vice presidents, A. R. Brown, 201 Clarendon Street, Boston, Mass.; F. L. Taylor, 45 Centre Street, Roxbury, Mass.

Recording secretary, Miss A. B. Drowne, 299 Centre Street, Dorchester, Mass.

Corresponding secretary, Miss H. A. Lancaster, 803 Shawmut Avenue, Roxbury, Mass.

Treasurer, H. P. Nickerson, 37 Upton Street, Boston, Mass.

Membership, active, 685.

Entrance fee and dues, $2.

Annual dues, $1; life, $15.

Annual meeting, second Monday in November.

Publications.—Yearbook; monthly calendar.

Pequit Bungalow on south shore of Pequit Lake, Canton, Mass.

Conducts Saturday walks, holiday excursions, and winter excursions in New Hampshire.

1918 outings.—July 13 to 27 at Eastville Inn, Martha's Vineyard, Mass.; September 7 to 22 at Iron Mountain House, Jackson, N. H.

Fresh Air Club, New York, N. Y.

President, H. E. Buermeyer, Hotel St. George, Brooklyn.

Vice president, Brainerd Kellogg, Morristown, N. J.

Secretary, Mortimer Bishop, 88 Nassau Street, New York.

Treasurer, A. F. Ormsbee, 183 Joralemon Street, Brooklyn.

Membership, active, 75.

Annual dues, $2.

Annual meeting, fourth Saturday in January.

Conducts Sunday walks and holiday excursions through the Highlands of the Hudson, also winter sport trips.

Annual excursion to the Catskills, May 29 to June 1.

Geographic Society of Chicago, Chicago, Ill.

President, F. T. West, 68 Division Street.

Vice presidents, Frank Hamlin, W. S. Monroe, L. A. Walton.

Recording secretary, Mrs. B. B. Bohn, 10980 Prospect Avenue, Chicago, Ill.

Domestic corresponding secretary, Mrs. L. R. Frazeur, 814 South Michigan Avenue, Chicago, Ill.

Treasurer, O. M. Schantz, 10 La Salle Street, Chicago.

Membership.—Resident, 631; life, 38; patrons, 3; nonresident, 16; honorary, 7; total, 695.

Entrance fee and dues.—Resident, $5; nonresident, $3.

Annual dues.—Resident, $5; nonresident, $3; life, $100.

Annual meeting, second Friday in May.

Publications.—Yearbook; Bulletin on Geographic Studies, published by the University of Chicago Press.

The society holds monthly and special meetings with lectures, conducts monthly excursions, and usually a western trip in the summer.

Geographical Society of Philadelphia, 400 Witherspoon Building, Philadelphia, Pa.

President, W. E. Lingelbach, 4304 Osage Avenue, Philadelphia.

Vice presidents, H. G. Bryant, 2013 Walnut Street, Philadelphia; L. W. Miller, 320 South Broad Street, Philadelphia.

Recording secretary, J. E. B. Buckenham, Municipal Hospital, Philadelphia.

Corresponding secretary, P. J. Sartain, 2006 Walnut Street, Philadelphia.

Treasurer, W. K. Haupt, 119 South Fourth Street, Philadelphia.

Membership.—Active, 860; nonresident, 33; life, 49; corresponding, 22; honorary, 15; total, 979.

Entrance fee and dues.—Active, $10; nonresident, $2.

Annual dues.—Active, $5; nonresident, $2; life, $100.

Annual meeting, first Wednesday in May.

Publication.—Bulletin of the Geographical Society of Philadelphia (quarterly), edited by F. L. Waldo and G. B. Roorbach, $2 a year.

Library of travel and reference at rooms of the society, 400 Witherspoon Building.

The society conducts afternoon walks and all-day outings in the spring and autumn.

Green Mountain Club, Inc., 35 Mead Block, Rutland, Vt.

President, C. P. Cooper, 300 West Street, Rutland, Vt.

Vice president, L. J. Paris, 324 South Union Street, Burlington, Vt.

Clerk, G. E. Chalmers, 35 Mead Block, Rutland, Vt.

Corresponding secretary, T. S. Dean, Masonic Temple, Burlington, Vt.

Treasurer, G. A. Mathers, 307 Main Street, Bennington, Vt.

SECTIONS.

Bennington.—President, J. L. Griswold; secretary, Miss Maude Harris.

Blue Mountain, Ryegate, Vt.—President, W. D. White; secretary, Miss O. J. McLam.

Burlington.—President, Mrs. C. P. Cowles, 100 Ledge Road; secretary, Miss C. M. Huntington, 325 Pearl Street.

Killington, Rutland, Vt.—President, G. G. Marshall; secretary, W. M. Ross.

New York, N. Y.—President, W. S. Monroe, 33 Portland Place, Montclair, N. J.; secretary, A. C. Tate, Stamford, Conn.

Sterling, Johnson, Vt.—President, C. H. Willey; secretary, Rev. F. W. Hazen.

Membership.—Active, 796; life, 7; total, 803.

Annual dues, $1; life, $25.

Annual meeting, second Wednesday in January.

Publication.—Guide book, edited by J. E. Woodruff.

Hawaiian Trail and Mountain Club, Honolulu, Hawaii.

President, W. F. Frear, Honolulu, Hawaii.

Vice president, J. S. Donaghho, Honolulu, Hawaii.

Secretary-treasurer, A. H. Ford, Honolulu, Hawaii.

Membership, active, 109.

Annual dues, $5.

The club constructs and maintains mountain trails, and conducts Sunday walks and climbing excursions on the various islands.

Klahhane Club, Port Angeles, Wash.

President, B. N. Phillips, Port Angeles, Wash.

Vice president, Miss Inez McLaughlin, Port Angeles, Wash.

Secretary, J. A. Baker, Port Angeles, Wash.

Treasurer, Frank Dann, Port Angeles, Wash.

Membership.—Active, 70; honorary, 19; total, 89.

Entrance fee and dues, $2.
Annual dues, $1.
Annual meeting, third Wednesday in January.
Publication, yearbook, edited by E. B. Webster, 50 cents a copy.
Lodge on slopes of Mount Angeles.
Conducts Saturday and Sunday walks.
1918 outing, July 6 to 14, on Mount Angeles, Wash.

Mazamas, 213 Northwestern Bank Building, Portland, Oreg.

President, R. W. Ayer, 689 Everett Street, Portland.
Vice president, W. P. Hardesty, 218 Northwestern Bank Building, Portland.
Recording secretary, Miss N. G. Richardson, 888 East Washington Street, Portland.
Corresponding secretary, A. F. Parker, 330 Northwestern Bank Building, Portland.
Treasurer, R. J. Davidson, 458 East Forty-ninth Street, North Portland.
Membership.—Active, 366; life, 3; honorary, 8; total, 377.
Entrance fee and dues, $3.
Annual dues, $3; life, $50.
Annual meeting, first Monday in October.
Annual publication, Mazama, edited by A. F. Parker, 50 cents a copy.
Clubrooms and library, 218 Northwestern Bank Building, Portland.
The club conducts Saturday and Sunday walks and holiday excursions. Annual Mount Hood outing, August 10 to 11.
1918 outing, July 13 to July 28, at Wallowa Mountains, Oregon.

Mountaineers, Central Building, Seattle, Wash.

President, E. S. Meany, 4025 Tenth Avenue NE., Seattle.
Vice president, G. E. Wright, 1227 Thirty-eighth Avenue N., Seattle.
Secretary, E. W. Allen, 402 Burke Building, Seattle.
Treasurer, F. G. Pugsley, care of County Clerk, County-City Building, Seattle.

BRANCHES.

Everett.—Chairman, H. B. Hinman, 2605 Baker Avenue; secretary, Miss Mabel McBain, 2532 Lombard Avenue. Conducts Sunday walks.

Tacoma.—President, J. H. Weer, Miller Apartments; secretary, Miss M. H. Mudgett, 314 Tacoma Building. Conducts Sunday walks. Annual midwinter outing at Mount Rainier National Park.

Membership.—Active, 519; life, 2; honorary, 1; total, 522.
Entrance fee and dues.—Residents of King County, $5; nonresidents, $4.
Annual dues.—Active, residents of King County, $4; nonresidents, $3; contributing, $10; life, $100.
Annual meeting, third Friday in October.
Publications, The Mountaineer (annually), edited by Winona Bailey, 50 cents a copy; Mountaineer Bulletin (monthly).
Clubrooms and library.—Central Building, Seattle; Snoqualmie Lodge, near Rockdale, on C. M. St. P. R. R. (toboggan and ski course); Kitsap Cabin, Rhododendron Park, near Chico, Kitsap County, reached via boat from Madison Street, Seattle to Chico.
The club conducts Sunday walks and holiday excursions.
Annual midwinter outing in Mount Rainier National Park.
1918 outing, July 25 to August 14, in Monte Christo district, Washington.

National Association of Audubon Societies, 1974 Broadway, New York City.

President, William Dutcher, Plainfield, N. J.
Acting president, F. A. Lucas, American Museum of Natural History, New York City.